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PRELIMINARY REPORT

(SIXTH BIENNIAL)

OF THE

STATE BOARD OF HORTICULTURE

OF THE

STATE OF CALIFORNIA,

FOR 1897-98.

SACRAMENTO:
A. J. JOHNSTON, : : : : SUPERINTENDENT STATE PRINTING.
1899.

CALIFORNIA

STATE BOARD OF HORTICULTURE.

1898.

ELLWOOD COOPER, President........................Santa Barbara
Commissioner for the Los Angeles District.

FRANK H. BUCK, Vice-President..............................Vacaville
Commissioner for the Napa District.

WILLIAM B. GESTER, Treasurer.............................Newcastle
Commissioner for the El Dorado District.

RUSS D. STEPHENS, Auditor...............................Sacramento
Commissioner for the State at Large.

THOMAS A. RICE...El Rio
Commissioner for the State at Large.

H. WEINSTOCK...Sacramento
Commissioner for the Sacramento District.

BEN M. MADDOX..Visalia
Commissioner for the San Joaquin District.

A. BLOCK..Santa Clara
Commissioner for the San Francisco District.

W. J. HOTCHKISS...Healdsburg
Commissioner for the Sonoma District.

B. M. LELONG, Secretary............Ex officio Chief Horticultural Officer
ALEXANDER CRAW...Quarantine Officer
ELLA F. HALLAHAN..Clerk

OFFICES:

STATE CAPITOL, SACRAMENTO, CAL.

Branch Office:

CLAY-STREET DOCK, SAN FRANCISCO.

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1896/98

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REPORT.

OFFICE OF STATE BOARD OF HORTICULTURE,
STATE CAPITOL, SACRAMENTO, CAL., October 1, 1898.

To His Excellency JAMES H. BUDD, *Governor, and the Honorable the Senate and Assembly of California:*

In accordance with law, we have the honor to submit herewith our sixth biennial report for the years 1897–98.

ELLWOOD COOPER,
F. H. BUCK,
WM. B. GESTER,
THOS. A. RICE,
H. WEINSTOCK,
BEN. M. MADDOX,
A. BLOCK,
W. J. HOTCHKISS,
R. D. STEPHENS,
Commissioners.

Attest:
B. M. LELONG, Secretary, and Chief Horticultural Officer.

WHAT THE BOARD HAS ACCOMPLISHED.

Objects of the Board.—The State Board of Horticulture was organized for the promotion of the horticultural interests of the State, in 1881, as an advisory board, and in 1883 was created a department by law. The law creating the Board provides that its members shall be specially qualified by practical experience and study in connection with the industries dependent upon horticulture, and it is composed of the most experienced horticulturists of the State.

Offices of the Board.—It maintains its headquarters in the State Capitol, and a branch office in San Francisco, at the Clay-Street dock, where fruit-growers and others can call or write for information on any subject pertaining to the fruit industry.

Meetings.—The Board meets in regular session semi-annually; the Executive Committee quarterly; special meetings when necessary.

Legislation.—It has secured the passage of strict quarantine laws and formulated quarantine regulations which have been enforced without fear or favor.

Fruit and Tree Quarantine.—Maintains an officer, with assistants, in San Francisco, to inspect every ship and sailing vessel for plants, which, if found infested by dangerous insect pests or diseases, are quarantined, disinfected, or destroyed. Also, maintains a surveillance over the fruit interests of the State and the work of local quarantine guardians.

Seizure of Infected Fruit.—The San Francisco markets have been glutted with poor, wormy fruit, greatly to the detriment of sound fruit. The growers of the State, in convention assembled, asked the Board to prohibit the sale of said fruit, as it meant ruin to their business. Several thousand boxes of pears and apples have been seized and dumped into the bay. This action naturally has caused considerable ill feeling among commission men, but we have no other alternative than to continue the enforcement of the law.

Oranges from Mexico.—There arrived at San Francisco two shiploads of oranges from Mexico; one was destroyed, the other fumigated before being allowed to land. The same were infested with dangerous insect pests.

First Shipments from Australia Destroyed.—A shipment of apples from Australia was destroyed by fire, being found infested with the "apple miner," a dangerous pest of the apple.

Shipments of Trees, etc. in Earth from Hawaiian Islands Prohibited from Landing.—Shipments of trees, plants, etc., in earth, from the Hawaiian Islands, have been prohibited from landing, on account of the danger of introducing the Hawaiian beetle, a very dangerous pest to all kinds of trees and plants, and all soil is cleaned from the roots and thrown into the bay.

Flying-Foxes Destroyed.—Two lots of flying-foxes were destroyed. They were found on board a steamer from Australia, where they are a great pest to all kinds of crops. Enormous sums have been expended toward their destruction, without avail, and lately the Australian Government has resorted to the use of dynamite and other high explosives as a means of destroying them.

Gypsy Moth.—A dissatisfied discharged employé of the Department of Agriculture of Massachusetts came to California and, either for revenge or spite, distributed eggs of the gypsy moth, which he had brought. A thorough search was instituted, the place was located, and a watch kept over it, until all danger of their young appearing was over. That the State escaped infection by this terrible pest was most fortunate, and was possibly due to the fact that the eggs were gathered from a section where insecticides had already been applied, thereby destroying their fertility, for the work of the Massachusetts Gypsy Moth Commission is most thorough.

Trees Inspected at Shipping Point.—Sacramento is the shipping center of the northern part of the State, and many plants have arrived shipped by way of Portland. Many of these bore evidence of fumigation, while others were found infested by dangerous pests. Large lots of apple trees were also received from various parts of the north. This necessitated an inspection of the freight every morning during the shipping season. Several lots of trees and plants found infested by dangerous pests were destroyed.

Forced the Appointment of a Horticultural Commission.—The importance of the creation of a County Board of Horticultural Commissioners was shown to the Board of Supervisors of Sacramento County, who had all along maintained that there was no necessity for the same. However, having determined to bring a mandamus suit against the Board of Supervisors to compel them to appoint, they appointed a commission composed of three practical fruit-growers, who will hereafter look after the horticultural interests.

Cargo of Trees Destroyed.—A cargo consisting of 325,000 orange trees from Tahiti was placed in quarantine at San Pedro. They were infected by the mining scale (*Howardia biclavis*), which lives under the bark and is therefore beyond the reach of remedies. An action was brought by the Los Angeles County Commissioner before the Superior Court, praying that they be declared a nuisance and asking for an order to destroy the same. The court, after hearing expert testimony, which proved conclusively that the trees had been treated five different times with the strongest insecticide prescribed, and the insects on them were still alive, ordered the entire cargo destroyed by fire, which was done, and the State freed from that scourge.

Packages Examined.—Packages containing fruits, branches, etc., infested by fungi and fruit pests, are constantly being received for identification and examination. Fruit-growers throughout the State, on finding that their trees are affected by insects or fungi not before observed, at once forward specimens to the office for identification. These inquiries are promptly answered and advice given.

Dangerous Cases.—When packages containing specimens of dangerous pests or tree diseases are observed, careful field and laboratory examinations are made.

Inspection of Packages Coming Through the Mails.—The Postmaster-General has been memorialized to allow packages containing plants, cions, or cuttings, coming through the mails, to be examined before delivery, as there is danger of importing injurious insects upon them. Consideration of memorial is still pending.

Conventions of Growers.—Conventions of fruit-growers were held in the principal fruit centers of the State and were generally well attended. While our special purpose is to interchange ideas and discuss the fruit problem, we are developing other interests and effecting results more important even than the successful culture of fruit. The harmony and unity of action and purpose that always govern our deliberations is creating a public sentiment.

Field Investigations.—When required, field investigations are made by the officers or specialists employed for the purpose.

Condition of the Fruit Industry.—In bulletin form has been shown the condition of the fruit industry, and the remedies for some of the obstacles it has to overcome..

Advertised Dried Fruit.—It has been illustrated, by exhibits at State and local fairs, "how dried fruits should be cooked," and the formulas published, which has been the means of increased demand for dried fruit.

Fruit Unions.—The Board promoted the organization of fruit unions for the sale of citrus and deciduous fruits.

Fruit-Growers and Shippers' Association.—Organized the California Fruit-Growers and Shippers' Association, which has been of great service to the fruit-growers of the State.

Frost Protection.—Published and distributed a bulletin on frost protection, which gave all the latest information on the subject.

Paris Green.—Published warnings as to the impure material sold, and showed how to detect the pure, which aided the fruit-growers very materially.

Telegraphic Consular Reports.—Sent a memorial to the United States Government and the Department of Agriculture to provide the people of the United States with telegraphic consular reports on all foreign-grown competing crops, together with a comparison of the growing crop with the crop of the past year.

Pollination.—Conducted numerous experiments in pollination of different sorts of prunes and plums—to be continued.

National Horticultural Quarantine.—Memorialized Congress and requested our Senators and Representatives to secure, if possible, the enactment of the original Senate bill, framed by the National Horticultural Convention held at Washington, D. C., March 6th and 7th, 1897. Also, protested against the passage of the Barlow House bill No. 6894, which we consider as inimical to our interests. Received assurances of its defeat.

Publications.—Published reports, treatises, and bulletins on various horticultural subjects, and distributed them generally among the fruit-growers of the State.

Beneficial Insects.—Instigated a search for beneficial insects in foreign countries; was instrumental in securing the introduction of the *Vedalia cardinalis*, which saved the citrus industry from destruction, by first agitating the possibility of its discovery. Sent an expert to Australia and adjacent countries in search of other parasites, which culminated in the introduction of the *Rhizobius ventralis*, an effective enemy of the black scale, the *Novius koebele*, an effective enemy of the cottony cushion scale, the *Cryptolæmus montrouzieri*, an effective enemy of the mealy bug, and many others.

Olive-Growers' Association.—Organized the State Olive-Growers, Association, which has been of great benefit to the industry.

Free Public Market.—Held a convention of growers to consider the feasibility of establishing a free public market in San Francisco.

State Floral Society.—Organized the State Floral Society, the only such institution on the Pacific Coast.

Nicaragua Canal.—Transmitted memorials to Congress for prompt legislation to secure the construction of the Nicaragua Canal, under Government control.

Interchange of Documents.—Interchanged documents and correspondence with similar bodies all over the world.

Adulteration of Food Products.—Memorialized Congress to pass an interstate food and drug law.

Refrigerator Charges.—Secured a reduction of refrigerator charges from this State to the East.

Tariff on Fruits.—Memorialized Congress for an increased duty on all fruits and fruit products.

Public Forests.—Sent memorial requesting the United States Government to take proper and sufficient steps to prevent the waste and destruction of the public forests on the mountains of California.

Spurious Olive Oil.—Held meetings of olive-growers and manufacturers of olive oil. Published the proceedings in pamphlet form, which were given wide circulation. Placing such information before the public has had the effect of creating in the minds of the people a knowledge of the great importance of a more general use of pure olive oil as food and for medicinal purposes. It also called the attention of the people to the wholesale adulteration of food products, where the price can be cheapened by the admixture of worthless and dangerous substances, and suggested methods to arrest the evil.

Imitation Olive Oil.—Secured the enactment of a law regulating the sale of imitation olive oil, which provides that every article, substance, or compound, or oil other than that extracted solely from the fruit of the olive tree, is declared to be imitation olive oil, and any person who adulterates or manufactures imitation olive oil must place (under heavy penalty) a label on the can, bottle, or vessel, bearing the words "imitation olive oil," printed thereon in capital letters, in a clear and durable manner, in the English language, in plain type designated and known as twenty-four-point type (two-line pica) of a Gothic face, said label to state plainly the name and address of the manufacturer or compounder, the name and place where manufactured or put up, and also the names and actual percentages of the different ingredients contained in each bottle, can, or vessel. It also prohibits imitation olive oil from being transported unless marked as such, and also prohibits oil bearing the semblance of olive oil manufactured out of the State, to be sold under the representation that it is manufactured in this State, and makes it a misdemeanor to offer for sale any such oil upon the receptacle of which is any cut, design, or mark intended to convey the belief that such is manufactured in this State.

Experiments.—Conducted experiments in processing fruit, insecticides, and fungicides, published the results in bulletin form, and distributed them widely throughout the State.

Food Test Department.—Petitioned the Board of Regents of the State University to establish a food test department in the School of Medicine. The people would not be slow in rejecting all adulterated goods if the result of tests and the danger to health proven by actual tests were widely published.

National Pure Food Bill.—Memorialized Congress asking for the enactment of the National Pure Food bill, known as the Brosius Pure Food bill.

System of Irrigation Recommended.—Recommended that growers should at once look to the possibility of a thorough system of irrigation by erecting basins in every mountain nook, and husbanding the water that runs to waste during the heavy rains, for use, and thus save their crops in years of drought.

World's Fair at Paris in 1900.—Recommended that the World's Fair at Paris in 1900 will afford us the greatest opportunity to extend our markets for fruits and fruit products; that every effort should be made toward securing an ample appropriation with which to make an elaborate and creditable display.

Freight Rates.—Maintained a Committee on Transportation and Freight Rates, which has succeeded in securing material reductions.

Exhibit of Fruit and Fruit Products in San Francisco.—Collected and installed the exhibits of the State Board of Trade, which were afterward exhibited at the Atlanta Exposition.

Exhibits at State Fairs.—Made exhibits at State Fairs, illustrating the methods of making olive oil, etc.

Organizations.—This Board lent its aid and encouragement to the formation of various organizations in the interest of fruit culture, and encouraged and promoted their splendid work.

Correspondence.—The correspondence of the office is exceedingly large and continues to increase. There is a constant inquiry upon matters pertaining to horticulture from throughout the State.

Biennial Report.—The biennial report for the years 1897–98 has been transmitted to the State Printer, and will be published when that department resumes operations.

Convention Reports.—The manuscripts of four State Conventions of Fruit-Growers remain unpublished, owing to the State Printing Department not being in operation.

Drought.—This year's crop, as a whole, was not altogether satisfactory, owing to drought, frost, etc. Besides, prices ruled low, owing to the timidity of money and depressed markets. The financial disturbances that have existed in many parts of the country are still being felt, and, coupled with bad climatic influences, many losses have been sustained. However, we ought to feel grateful that they were not greater.

To Further Ideas Advanced.—Several valuable ideas advanced by the Board remain unperfected, among them that of seeking foreign markets for fruit and fruit products.

INSPECTION OF STEAMERS AND SAILING VESSELS.

LIST OF VESSELS THAT ARRIVED AT SAN FRANCISCO WITH TREES AND PLANTS ON BOARD, AND INSPECTED.

Date.	Vessel.	Where from.	Consignment.	Disposition.
1896.				
Sept. 2	Walla Walla	Victoria	2 bxs. and 1 bkt. plants	Clean.
Sept. 3	Colon	Central America	1 bx. orchids	Clean.
Sept. 7	Umatilla	Victoria	1 lot plants	Clean.
Sept. 9	Newport	Central America	2 lots plants	Part destroyed
Sept. 10	City of Peking	China and Japan	3 lots plants	Clean.
Sept. 16	Australia	Honolulu	6 lots plants	Part destroyed.
Sept. 18	Walla Walla	Victoria	1 bdl. plants	Clean.
Sept. 21	City of Sydney	Central America	4 orn'tl plants 1 bx. orchids.	Part destroyed.
Sept. 22	Doric	China and Japan	5 lots plants	Part destroyed.
Sept. 23	Tropic Bird	Tahiti	1 case plants, 2 bxs. plants	Mostly destroyed.
Sept. 24	Mariposa	Australia, N. Zealand, and Samoa	1 case trees	Disinfected.
			1 lot plants	Clean.
Sept. 27	City of Puebla	Victoria	2 lots plants	Part destroyed.
Sept. 30	China	China and Japan	4 crates cherry plum trees, Diaspis amygdali; 3 lots plants	Trees destroyed; plants clean.
Oct. 7	Belgic	China and Japan	Lily bulbs and 1 plant	Clean.
Oct. 10	Australia	Honolulu	3 lots plants, 2 bxs. plants	Clean.
Oct. 12	City of Puebla	Victoria	1 bkt. currant plants	Clean.
Oct. 17	Orizaba	Mazatlan	137 bxs. oranges	Fumigated.
Oct. 17	Walla Walla	Victoria	2 lots plants	Clean.
Oct. 19	Peru	China and Japan	1 bx. plants, 2 lots plants	Part destroyed, others fumigated.
Oct. 22	Monowai	Australia, N. Zealand, and Samoa	1 bx. plants, 1 bkt. plants	Part destroyed.
Oct. 23	Acapulco	Central America	1 lot plants, 1 bx. orchids	Clean.
Oct. 25	Coptic	China and Japan	1 lot plants	Part destroyed.
Oct. 27	City of Puebla	Victoria	2 lots plants	Clean.
Nov. 5	Australia	Honolulu	3 lots plants	Part destroyed.
Nov. 6	Colon	Central America	4 bxs. pineapple plants	Clean.
Nov. 7	City of Rio de Janeiro.	China and Japan	171 cs. plants, 1 ornmt'l plant.	Part destroyed, others fumigated and dipped.
Nov. 8	Mexico	Victoria	2 ornmt'l plants	Clean.
Nov. 13	Galilee	Tahiti	2 plants	Clean.
Nov. 17	Orizaba	Mexican ports	1 bx. palms	Destroyed.
Nov. 17	Orizaba	Baja California	900 bxs. oranges	Fumigated.
			1 bx. cacti	Clean.
Nov. 19	Alameda	Australia, N. Zealand, and Samoa	1 bx. tree-fern trunks	Clean.
			5 lots plants	Part destroyed, others disinfected.
Nov. 20	City of Sydney	Central America	3 lots plants	Clean.
Nov. 24	City of Peking	China and Japan	53 cs. plants	Part destroyed, others fumigated.
			1 bx. plants	Destroyed.
			4 lots plants	Clean.
Nov. 26	City of Puebla	Victoria	1 Ficus macrophylla	Clean.
Nov. 30	Doric	China and Japan	107 cs. plants	Part destroyed, others fumigated.
			1 crate plants	Destroyed.
			5 lots plants	Part destroyed.
			302 cs. plants	New York.
Dec. 1	San José	Central America	1 bkt. orchids	Clean.
Dec. 9	City of Para	Central America	2 lots plants	Clean.
Dec. 10	China	China and Japan	29 cs. plants	Part destroyed, others fumigated.
			4 lots plants	Clean.
Dec. 17	Mariposa	Australia, N. Zealand, and Samoa	6 lots plants	Part destroyed.
			10 bxs. oranges (from Samoa).	Destroyed.

Vessels with Trees or Plants on Board—Continued.

Date.	Vessel.	Where from.	Consignment.	Disposition.
1896.				
Dec. 17	Orizaba	Mazatlan and Baja California.	9 palms	Destroyed.
			70 bxs oranges	Fumigated.
Dec. 21	Acapulco	Central America	7 bxs. green oranges	Clean.
Dec. 22	Belgic	China and Japan	11 crts. cherry and plum trees.	Destroyed.
			4 cs. plants	Part destroyed.
			5 lots plants	Part destroyed, others fumigated.
			1,500 bxs. Japanese oranges.	Fumigated.
Dec. 23	Australia	Honolulu	151 sks. pineapple plts.	Florida.
			5 lots plants	Part destroyed.
Dec. 28	Peru	China and Japan	13 cases plants	Fumigated.
			1 lot plants	Clean.
			2,595 bxs. Japanese oranges.	Fumigated.
1897.				
Jan. 6	Langdale	Australia	2 lots plants	Clean.
Jan. 7	Mexico	Victoria	60 bxs. Japanese oranges.	Fumigated.
Jan. 7	Coptic	China and Japan	10 cs. plants, 8 crts. trees, 3 lots plants.	Part destroyed, others disinfected.
			767 bxs. Japanese oranges.	Fumigated.
Jan. 9	Newport	Central America	2 lots plants	Disinfected.
Jan. 10	Colon	Central America	2 lots plants	Dipped.
Jan. 15	Monowai	Australia, N. Zealand, and Samoa	2 lots plants	Part destroyed.
Jan. 15	Walla Walla	Victoria	1,089 bxs. Japanese oranges	Fumigated.
Jan. 17	Orizaba	Mexican ports	1 bx. palms	Clean.
Jan. 18	City of Rio de Janeiro.	China and Japan	158 cs. plants	Part destroyed, others fumigated.
			2 lots plants	Clean.
			272 bxs. Japanese oranges.	Fumigated.
Jan. 20	Australia	Honolulu	3 lots plants	Part destroyed.
Jan. 21	City of Papeete	Tahiti	1 box crinums	Clean.
Jan. 23	Gaelic	China and Japan	24 cs. plants	Part destroyed, others fumigated.
			1,970 bxs. Japanese oranges	Fumigated.
			226 bxs. bulbs, 26 bxs. Chinese oranges	Fumigated.
			2 lots plants	Part destroyed.
Jan. 30	John D. Spreckels	Hawaii	1 box and 2 bbls. bird-nest ferns	Clean.
Feb. 5	City of Peking	China and Japan	34 cs. plants	Part destroyed, others fumigated.
			1 lot plants	Clean.
Feb. 9	City of Puebla	Victoria	1 bdl. hop plants	Destroyed.
Feb. 11	Alameda	Australia, N. Zealand, and Samoa	4 lots plants	Part destroyed.
Feb. 13	Doric	China, Japan, and Honolulu.	20 cs. plants	Part destroyed, others fumigated.
			1 lot plants	Part destroyed.
			5 bdls. palm leaves	Fumigated.
Feb. 14	City of Para	Central America	2 plants	Destroyed.
Feb. 15	Walla Walla	Victoria	19 crts. plants from Japan.	Part destroyed, others fumigated.
Feb. 16	Wm. G. Irwin	Hawaii	2 ferns	Clean.
Feb. 17	Australia	Honolulu	227 sks. pineapple plants.	Florida.
			2 wild roses	Clean.
Feb. 18	Orizaba	Baja California and Mazatlan.	479 bxs. oranges, 10 bxs. limes, 5 bxs peppers	Fumigated.
			2 lots plants	Part destroyed.
Feb. 21	Umatilla	Victoria	5 crts. plants from Japan.	Fumigated.

VESSELS WITH TREES OR PLANTS ON BOARD—Continued.

Date.	Vessel.	Where from.	Consignment.	Disposition.
1897.				
Feb. 23	China	China, Japan, and Honolulu.	82 cs. plants	Part destroyed, others fumigated.
			7 lots plants	Part destroyed.
Feb. 24	Acapulco	Central America	437 bxs. limes	Clean.
Mar. 3	Walla Walla	Victoria	1 lot plants	Clean.
Mar. 6	San Blas	Panama	1 bx. plants	Clean.
Mar. 13	Zealandia	Australia, N. Zealand and Samoa.	2 lots plants	Part destroyed.
Mar. 17	City of Sydney	Central America	2 palms	Destroyed.
			2 bdls. orchids	Clean.
Mar. 17	Walla Walla	Victoria	1 bdl. deciduous trees	Clean.
Mar. 17	Australia	Honolulu	3 lots plants	Part destroyed.
Mar. 17	Peru	China and Japan	20 cs. plants	Part destroyed, others fumigated.
Mar. 20	Orizaba	Mexican ports	1 bkt. orange trees	Destroyed.
Mar. 20	Coptic	China and Japan	60 cs. plants	Fumigated.
			3 lots plants	Destroyed.
Mar. 28	Colon	Panama	1 Lapageria rosea (fm. Chile).	Clean.
Mar. 31	City of Rio de Janeiro.	China and Japan	8 cs. plants	Fumigated.
			3 lots plants	Part destroyed.
Apr. 1	S. N. Castle	Hawaii	1 lot plants	
Apr. 1	Columbia	Portland, fm Japan	12 crts. plants	Fumigated.
Apr. 3	Walla Walla	Victoria, fm Japan	17 crts. plants	Fumigated.
Apr. 5	Newport	Panama	2 vases caladiums	Clean.
Apr. 8	Monowai	Australia, N. Zealand, Samoa, and Honolulu.	4 cs. plants	Fumigated.
			3 lots plants	Part destroyed.
Apr. 11	Gaelic	China, Japan, and Honolulu.	14 cs. plants	Fumigated.
			1 bdl. artificial cherry flowers inserted in fresh cherry branches infested with Diaspis amygdali scales.	Destroyed.
Apr. 12	City of Peru	Panama	1 lot plants	Clean.
Apr. 14	Australia	Honolulu	4 lots plants	Part destroyed.
Apr. 17	Walla Walla	Victoria	1 bdl. raspberry and gooseberry plants.	Clean.
			13 cs. plants	Fumigated.
			2 lots plants	Clean.
Apr. 19	Orizaba	Baja California and Mazatlan.	2 palms	Clean.
Apr. 24	Acapulco	Central America	1 bx. orchids	Clean.
Apr. 27	City of Puebla	Victoria	1 bx. holly plants	Clean.
			1 bdl. black currant bushes, twig borers.	Destroyed.
Apr. 29	Doric	China, Japan and Honolulu.	4 lots plants	Destroyed.
May 2	Walla Walla	Victoria	1 box plants	Clean.
May 6	Umatilla	Victoria	1 plant	Destroyed.
May 6	Alameda	Australia, N. Zealand, Samoa, and Honolulu.	6 cases plants	Fumigated.
			5 lots plants	Part destroyed, others dipped.
			69 bxs. Tasmania apples. fruit miners.	Destroyed.
May 8	J. D. Spreckels	Hawaii	2 bbls. bird-nest ferns	Clean.
May 9	City of Sydney	Central America	2 lots orchids	Part destroyed.
May 10	China	China, Japan and Honolulu.	9 lots plants	Part destroyed.
			12 cases plants	Fumigated.
May 12	City of Puebla	Victoria	2 bdls. plants	Clean.
May 12	Australia	Honolulu	3 lots plants	Part destroyed.
May 17	Walla Walla	Victoria	1 bdl. raspberry plts	Clean.
May 21	Belgic	China and Japan	20 cases plants	Part destroyed, others fumigated.
			4 lots plants	Part destroyed.
May 22	Umatilla	Victoria	1 plant	Clean.
May 23	Orizaba	Mexican ports	3 bxs. Mexican guavas	Clean.

VESSELS WITH TREES OR PLANTS ON BOARD—Continued.

Date.	Vessel.	Where from.	Consignment.	Disposition.
1897.				
May 25	Colon	Panama	1 box orchids	Clean.
			palms	Clean.
May 30	Peru	China and Japan	1 plant	Clean.
June 1	Walla Walla	Victoria	1 box plants	Clean.
June 1	Mariposa	Australia, N. Zealand, Samoa, and Honolulu.	1 case plants	Dipped.
			4 lots plants	Clean.
June 6	Coptic	China and Japan	2 cases orchids	Clean.
			5 lots plants	Part destroyed.
June 9	Australia	Honolulu	236 sks. pineapple plts.	Florida.
			2 lots plants	Part destroyed.
			2 wreaths "red wax scale."	Destroyed.
June 15	City of Rio de Janeiro.	China and Japan	3 lots plants	Part destroyed.
June 16	Walla Walla	Victoria	2 lots ferns	Clean.
June 17	Wellington	Comox	3 boxes ferns, 1 cedar	Clean.
June 21	J. D. Spreckels	Mahukona, H. I.	6 bxs. bird-nest ferns	Clean.
June 26	City of Puebla	Victoria	6 roses in pots	Clean.
June 27	Orizaba	Baja California and Mazatlan	1 box plants, 2 banana plants.	Clean.
June 27	Gaelic	China and Japan	3 lots plants	Part destroyed.
June 29	Moana	Australia, N. Zealand, Samoa, and Honolulu.	232 sks. pineapple plants,	Florida.
			4 lots plants	Part destroyed.
July 1	Walla Walla	Victoria	3 lots plants	Clean.
July 2	Acapulco	Panama	1 orchid	Clean.
July 6	Umatilla	Victoria	1 plant	Clean.
July 11	City of Puebla	Victoria	1 plant	Clean.
July 11	City of Sydney	Panama	1 bx. Waldenia	Clean.
July 11	Doric	China and Japan	2 crts. plants	Fumigated.
			3 lots plants	Part destroyed.
			cage with large katydid.	Killed.
July 21	Umatilla	Victoria	1 rhubarb root	Clean.
July 24	China	China and Japan	6 lots plants	Part destroyed.
July 26	Orizaba	Baja California and Mazatlan.	1 lot plants	Clean.
July 26	City of Puebla	Victoria	1 bx. ferns	Clean.
July 29	Alameda	Australia, N. Zealand, Samoa, and Honolulu.	1 cs. fern trunks	Clean.
			1 cs. araucarias	Dipped.
			1 plant	Destroyed.
July 31	Walla Walla	Victoria	4 lots plants fm. Seattle	Clean.
Aug. 3	Belgic	China, Japan, and Honolulu.	1 cs. fern trunks	Clean.
			1 bx. ferns	Clean.
			Wreath, "red wax scale."	Destroyed.
Aug. 4	Australia	Honolulu	1 bx. ferns	Clean.
Aug. 5	Umatilla	Victoria	1 fern	Clean.
Aug. 10	Peru	China and Japan	2 dwarf cedars	Clean.
Aug. 15	Walla Walla	Victoria	1 small bx. plants	Clean.
Aug. 16	Mauna Alo	Honolulu	18 tons pineapple plts.	Florida.
Aug. 21	Doric	China and Japan	1 Retinospora	Clean.
Aug. 23	N. H. Castle	Hawaii	2 palms	Destroyed.
			2 bkts. small seedling palms.	Clean.
Aug. 25	Coptic	China and Japan	4 lots plants	Clean.
Aug. 26	Orizaba	Baja California and Mazatlan.	3 lots plants	Part destroyed.
Aug. 26	Mariposa	Australia, N. Zealand, Samoa, and Honolulu.	9 lots plants	Clean.
			1 cs. tree-fern trunks	Clean.
Aug. 30	Walla Walla	Victoria and Puget Sound.	1 lot small plants	Clean.
Sept. 1	Australia	Honolulu	1 bx. plants	Dipped.
Sept. 9	City of Sydney	Panama	2 bx. plants, 3 lots plts.	Part destroyed.
Sept. 9	City of Puebla	Victoria and Puget Sound ports	1 bdl. cedars	Clean.

VESSELS WITH TREES OR PLANTS ON BOARD—Continued.

Date.	Vessel.	Where from.	Consignment.	Disposition.
1897.				
Sept. 11	Gaelic	China and Japan	3 plants	Clean.
Sept. 14	Walla Walla	Victoria and Puget Sound ports.	2 plants	Clean.
Sept. 20	Tropic Bird	Tahiti	3 Dracenas	Clean.
Sept. 20	Colon	Central America	736 boxes limes	Clean.
Sept. 22	City of Peking	China and Japan.	1 box plants	Florida.
			3 lots plts. (cherry and plum).	Destroyed.
Sept. 23	Moana	Australia, N. Zealand, Samoa and Honolulu.	7 wreaths	Destroyed.
			1 pkg. seedl'g palms, by mail.	Clean.
Sept. 24	City of Puebla	Victoria and Puget Sound ports.	Basket of ferns	Clean.
Sept. 24	Orizaba	Baja California and Mazatlan.	23 boxes limes	Clean.
			2 plants	Clean.
Sept. 29	Australia	Honolulu	2 lots plants	Part destroyed.
Sept. 30	San Blas	Central America	1 wreath	Destroyed.
			900 boxes limes	Clean.
			6 boxes orchids	Clean.
			50 tea plants, Diaspis amygdali.	Destroyed.
			6 lots plants	Part destroyed.
Oct. 4	Umatilla	Victoria and Puget Sound ports.	1 bundle rose bushes	Clean.
Oct. 8	China	China and Japan	6 lots plants	Part destroyed.
Oct. 8	City of Para	Central America	627 boxes limes	Clean.
			1 plant	Clean.
Oct. 19	Umatilla	Victoria and Puget Sound ports.	1 lot plants	Part destroyed.
			1 vase selaginella fm. Japan.	Clean.
Oct. 19	Belgic	China and Japan	14 cases plants	Fumigated.
			2 lots plants	Clean.
Oct. 20	Aloha	Hawaii	2 bxs. seedling palms	Dipped.
			1 box banana plants	Clean.
Oct. 20	Alameda	Australia, N. Zealand, Samoa and Honolulu.	2 cases plants	Part destroyed, others fumigated.
			4 cases plants	Part destroyed.
Oct. 25	Orizaba	Baja California and Mazatlan.	2 plants	Clean.
Oct. 27	Australia	Honolulu	1 lot plants	Clean.
			15 boxes oranges	Fumigated.
Oct. 29	Walla Walla	Victoria and Puget Sound ports.	2 lots plants	Clean.
Oct. 30	Peru	China and Japan	3 plants	Clean.
Nov. 1	State of Cal.	Plants fm. Japan, via Portland, Or.	23 cases plants	Fumigated.
Nov. 3	Umatilla	Plants fm. Japan, via Victoria.	9 cases plants	Fumigated.
Nov. 6	Coptic	China and Japan	8 crates oranges	Destroyed.
			3 lots plants	Part destroyed.
Nov. 13	Walla Walla	Victoria and Puget Sound ports.	1 package ferns	Clean.
Nov. 16	City of Rio de Janeiro.	China and Japan	2 cases plants	Fumigated.
			4 plants	Clean.
			1,116 boxes Japanese oranges.	Fumigated.
Nov. 18	Mariposa	Australia, N. Zealand, Samoa, and Honolulu.	5 pkgs plants	Dipped.
			2 lots plants	Clean.
Nov. 19	Umatilla	Victoria and Puget Sound ports.	1 bdl. shade trees	Clean.
Nov. 23	State of Cal.	Japan, via Portland, Or.	5 cases plants	Fumigated.
Nov. 24	Australia	Honolulu	1 bx. pineapple plants	Passed.
			3 plants	Clean.
			1 box oranges	Destroyed.
Nov. 27	Gaelic	China, Japan, and Honolulu.	45 cases plants	Fumigated.
			5 lots plants	Part destroyed.
			2,274 bxs. Japanese anges.	Fumigated.

VESSELS WITH TREES OR PLANTS ON BOARD—Continued.

Date.	Vessel.	Where from.	Consignment.	Disposition.
1897.				
Dec. 1	San Blas	Central America	1 box orchids	Clean.
Dec. 3	Umatilla	Japan, via Puget Sound.	3 cases plants	Fumigated.
Dec. 4	City of Peking	China, Japan, and Honolulu.	110 cases plants	Fumigated, part destroyed.
			3 lots plants	Part destroyed.
			4,373 bxs. Japanese oranges.	Fumigated.
Dec. 8	City of Para	Central America	369 boxes limes	Clean.
			1 plant	Clean.
Dec. 9	City of Puebla	Victoria and Puget Sound ports.	37 bbls. holly	Clean.
Dec. 13	Walla Walla	Victoria and Puget Sound ports.	1 bdl. roses	Clean.
Dec. 16	Doric	China, Japan, and Honolulu.	25 cases plants	Part destroyed, others fumigated.
			7 lots plants	Part destroyed.
			2,364 bxs. Japanese oranges.	Fumigated.
Dec. 16	Moana	Australia, N. Zealand, Samoa, and Honolulu.	8 crates plants	Rejected.
			3 lots plants	Clean.
			1 bx. oranges (Samoa)	Destroyed.
Dec. 17	Tropic Bird	Tahiti	1 plant	Clean.
Dec. 17	Umatilla	Victoria and Puget Sound ports.	1 box plants	Clean.
			8 bbls. holly	Clean.
Dec. 22	Australia	Honolulu	2 lots plants	Clean.
			1 wreath "red wax scale."	Destroyed.
Dec. 23	City of Puebla	Victoria and Puget Sound ports.	2 pkgs. trees	Clean.
Dec. 23	China	China, Japan, and Honolulu.	26 cases plants	Fumigated.
			3 lots plants	Part destroyed.
			429 boxes Japanese oranges	Fumigated.
Dec. 27	Aztec	Plants from Japan	2 lots plants	Part destroyed.
Dec. 29	Walla Walla	Victoria and Puget Sound ports.	3 bdls. berry plants	Clean.
Dec. 29	Orizaba	Baja California and Mazatlan.	6 cactus plants	Clean.
1898.				
Jan. 1	Belgic	China, Japan, and Honolulu	53 cases plants	Fumigated, part destroyed.
			878 boxes Japanese oranges	Fumigated.
Jan. 14	Alameda	Australia, N. Zealand, Samoa, and Honolulu.	4 lots plants	Part destroyed.
Jan. 19	Australia	Honolulu	3 lots plants	Part destroyed.
Jan. 22	Colon	Central America	3 lots plants	Part destroyed.
Jan. 25	Coptic	China and Japan	6 lots plants	Part destroyed.
			408 boxes Japanese oranges	Fumigated.
Jan. 26	Ex Peru	China	2 lots plants	Destroyed.
Feb. 1	Orizaba	Baja California and Mazatlan.	47 boxes tomatoes	Clean.
Feb. 2	City of Rio de Janeiro	China and Japan	79 cases plants	Fumigated.
			4 lots plants	Part destroyed.
Feb. 7	City of Puebla	Victoria and Puget Sound ports.	208 boxes Japanese oranges	Fumigated.
Feb. 9	City of Para	Central America	1 box plants	Fumigated.
Feb. 10	Mariposa	Australia, N. Zealand, Samoa, and Honolulu.	2 lots plants	Clean.
			624 pkgs. onions	
Feb. 11	Walla Walla	Victoria and Puget Sound ports.	2 plants	Clean.
Feb. 12	Australia	Honolulu	4 lots plants	Clean.
			3 wreaths	Destroyed.

VESSELS WITH TREES OR PLANTS ON BOARD—Continued.

Date.	Vessel.	From.	Consignment.	Disposition.
1898.				
Feb. 13	Gaelic	China and Japan	36 cases plants	Fumigated.
			435 boxes oranges	Fumigated.
Feb. 18	Newport	Central America	2 plants	Clean.
			A passenger had a few oranges with mining scale upon the fruit, from Colima.	Destroyed.
Feb. 21	City of Puebla	Victoria and Puget Sound ports.	6 plants	Clean.
Feb. 22	City of Peking	China and Japan	13 cs. plants	Fumigated
			a lot plants	Clean.
			1 bdl. raspberry plts.	Clean.
Feb. 28	Doric	China and Japan	98 cs. plants	Fumigated.
Mar. 1	Acapulco	Central America	Shipment of oranges	Destroyed.
Mar. 5	Orizaba	Mexican ports	5 bxs. plants	Part destroyed, others fumigated.
Mar. 9	Zealandia	Honolulu	2 bxs. plants	Part destroyed.
			97 crates pineapples	Fumigated.
Mar. 9	Moana	Australia, N. Zealand, Samoa, and Honolulu.	1 box plants	Dipped.
Mar. 12	City of Sidney	Central America	646 bxs. limes	Clean.
Mar. 13	China	China, Japan, and Honolulu.	1 pkg. sweet potato plts., "leaf miners."	Destroyed.
			5 crts and 1 bkt. pineapple.	Fumigated.
			3 plants	Clean.
Mar. 13	Walla Walla	Victoria and Puget Sound ports.	1 bdl. aucuba and ardesias from Japan.	Clean.
			1 bdl. gooseberry and currant plants.	Clean.
Mar. 22	Belgic	China, Japan, and Honolulu.	25 cs. plants	Fumigated.
			6 bxs. Chinese orange	Fumigated.
			1 lot plants	Fumigated.
Mar. 22	Colon	Central America	511 bxs. limes	Clean.
			5 bxs. mangoes	Clean.
Mar. 29	Tropic Bird	Tahiti	2 plants	Destroyed.
Mar. 30	San Blas	Central America	670 bxs. limes	Clean.
			2 bdls. cuttings	Destroyed.
Apr. 1	Zealandia	Honolulu	21 crts. pineapples	Fumigated.
			10 loose lts. pineapples	Fumigated.
Apr. 6	Alameda	Australia, N. Zealand, Samoa, and Honolulu.	1 case plants	Part destroyed.
			6 lots plants	Part destroyed, others fumigated.
Apr. 8	Orizaba	Mexican ports	821 bxs. tomatoes	Passed.
Apr. 12	Umatilla	Victoria and Puget Sound ports.	3 lots plants	Clean.
Apr. 17	Walla Walla	Victoria and Puget Sound ports	2 lots plants	Clean.
Apr. 19	Newport	Central America	369 bxs. limes	Clean.
			638 bxs. tomatoes	Clean.
			100 bxs. mushrooms.	Clean.
Apr. 22	Rio de Janeiro	China, Japan, and Honolulu.	1 lot plants	Destroyed.
Apr. 26	Zealandia	Honolulu	5 lots plants	Part destroyed.
			10 crates pineapples.	Fumigated.
			1 lais wreath	Destroyed.
Apr. 30	Gaelic	China, Japan, and Honolulu.	31 cases plants	Fumigated.
May 1	Acapulco	Central America	442 bxs. limes	Clean.
			750 bxs. tomatoes	Clean.
May 3	Mariposa	Australia, N. Zealand, Samoa, and Honolulu.	5 lots plants	Part fumigated, others destroyed.
May 9	City of Peking	China, Japan, and Honolulu.	2 lots plants	Destroyed.
			2 lots plants	Part destroyed.
			4 cases plants	Part destroyed, others fumigated.
			12 crates pineapples.	Fumigated.

VESSELS WITH TREES OR PLANTS ON BOARD—Continued.

Date.	Vessel.	From.	Consignment.	Disposition.
1898.				
May 10	Curacao	Mexican ports	1 lot plants	Clean.
May 10	San Jose	Central America	1 lot plants	Dipped.
			517 boxes limes	Clean.
May 10	City of Sydney	Central America	2 lots plants	Clean.
May 12	Walla Walla	Victoria and Puget Sound ports.	1 lot plants	Clean.
May 16	Doric	China, Japan, and Honolulu.	5 lots plants	Part destroyed, others fumigated.
			45 crates pineapples	Fumigated.
May 21	Bristol	British Columbia	2 boxes plants	Clean.
May 22	Colon	Central America	2 lots plants	Clean.
			520 boxes limes	Clean.
			1 plant	Clean.
May 23	City of Puebla	Victoria and Puget Sound ports.	1 plant	Clean.
May 24	Zealandia	Honolulu	3 lots plants	Fumigated.
			217 crts. pineapples	Fumigated.
May 27	China	China, Japan, and Honolulu.	5 cases plants, 6 lots plants.	Part destroyed.
June 1	Moana	Australia, N. Zealand, Samoa, and Honolulu.	1 case plants, 2 lots plants.	Part destroyed, others dipped.
			191 crts. pineapples	Fumigated.
June 2	San Blas	Central America	1 plant	Clean.
			493 bxs. limes	Clean.
June 7	Belgic	China, Japan, and Honolulu.	1 cs. plants	Part destroyed, others dipped.
			6 lots plants, 163 crates pineapples	Fumigated.
June 8	Aloha	Hawaiian Islands	1 lot plants	Part destroyed, others dipped.
June 9	City of Para	Central America	1 bx. orchids, 476 bxs. limes.	Clean.
June 13	Curacoa	Mexican ports	2 lots plants	Clean.
June 18	Umatilla	Victoria and Puget Sound ports.	1 plant	Clean.
June 18	San Juan	Central America	2 cases orchids	Clean.
June 21	Newport	Central America	442 bxs. limes	Clean.
			4 pkgs. orchids	Part destroyed, others fumigated.
June 24	Peru	China, Japan, and Honolulu.	1 lot plants	Part destroyed.
			112 crates pineapples	Fumigated.
June 25	Coptic	China, Japan, and Honolulu.	1 case plants	Part destroyed, others fumigated.
			2 lots plants, 35 crates pineapples	Fumigated.
June 29	Alameda	Australia, N. Zealand, Samoa, and Honolulu.	3 lots plants, 341 crates pineapples.	Fumigated.
July 1	Umatilla	Victoria and Puget Sound ports.	14 cases trees from Japan.	Fumigated.
July 7	Rio de Janeiro	China, Japan, and Honolulu.	118 crates pineapples, 2 lots plants.	Fumigated.
July 12	San José	Central America	1 bx. plants, 161 bxs. limes.	Clean.
July 14	Curacoa	Mexican ports	1 bx. lily-roots and cactus.	Clean.
July 15	Gaelic	China, Japan, and Honolulu.	4 lots plants	Part destroyed.
			89 crates pineapples	Fumigated.
July 20	Starbuck	Central America	1 pkg. orchids, 336 bxs. limes.	Clean.
July 21	Queen	Victoria and Puget Sound ports.	1 bskt. ferns	Clean.
July 27	Mariposa	Australia, N. Zealand, Samoa, and Honolulu.	151 crates pineapples	Fumigated.
July 31	Umatilla	Victoria and Puget Sound ports.	2 lots plants	Clean.
Aug. 2	San Blas	Central America	613 bxs. limes	Clean.
Aug. 2	Doric	China, Japan, and Honolulu.	2 lots plants	Clean.
			52 crates pineapples	Fumigated.

VESSELS WITH TREES OR PLANTS ON BOARD—Continued.

Date.	Vessel.	From.	Consignment.	Disposition.
1898.				
Aug. 10	San Juan	Central America	1 vase caladiums, 922 bxs. limes.	Clean.
Aug. 10	Walla Walla	Victoria and Puget Sound ports.	2 bskt. ferns	Clean.
Aug. 11	Curacao	Mexican ports	1 bx. plants	Part destroyed.
Aug. 14	City of Sydney	Manila via Japan	2 lots plants	Fumigated.
Aug. 15	Umatilla	Victoria and Puget Sound ports.	1 lot ferns	Clean.
Aug. 17	Australia	Manila via Japan	1 lot plants	Fumigated.
Aug. 20	Queen	Victoria and Puget Sound ports.	1 lot plants	Clean.
			1 package peas from Japan, infested with new weevil.	Destroyed.
Aug. 20	Glenfarg	China, Japan, and Honolulu.	16 crates pineapples	Fumigated.
Aug. 22	Belgic	China, Japan, and Honolulu.	2 lots plants	Fumigated.
Aug. 23	Rhoderick Dhu	Hawaiian Islands.	1 lot plants	Clean.
Aug. 25	Moana	Australia, N. Zealand, Samoa, and Honolulu.	1 lot plants	Clean.
			48 crates pineapples	Fumigated.
Sept. 1	Acapulco	Central America	1 plant, 806 boxes limes	Clean.
Sept. 4	Queen	Victoria and Puget Sound ports.	1 lot plants	Clean.
Sept. 8	Curacao	Mexican ports	4 boxes guavas, 75 boxes limes.	Clean.
Sept. 8	Glengyle	China, Japan, and Honolulu.	Pineapples	Fumigated.
Sept. 9	San José	Central America	600 boxes limes	Clean.
Sept. 9	Walla Walla	Victoria and Puget Sound ports.	2 packages plants	Clean.
			3 lots plants	Part destroyed.
Sept. 9	Coptic	China, Japan, and Honolulu.	34 crates pineapples, 96 bxs. Chinese oranges	Fumigated.
Sept. 19	Queen	Victoria and Puget Sound Ports.	12 cedar trees	Clean.
Sept. 20	Australia	Honolulu	18 crates pineapples, 4 barrels pomelos.	Fumigated.
Sept. 21	Alameda	Australia, N. Zealand, Samoa, and Honolulu.	2 lots plants	Clean.
			12 box oranges	Fumigated.
			150 crates pineapples	Florida.
			1 case plants	Fumigated.
Sept. 30	Gaelic	China, Japan, and Honolulu.	1 case cedars	Clean.
			4 lots plants	Part destroyed.
			185 boxes pineapple plants.	Florida.

SUMMARY OF STEAMSHIP INSPECTIONS, ETC.

The following is a summary of steamship inspections in the State from January 4, 1896, to December 4, 1897:

From China	78
From Australia and New Zealand	28
From Central America	37
From South America	10
From South Sea Islands	6
From Sandwich Islands	37
From Victoria	63
From Mexican ports	24
Total	283

Plants, Trees, Fruit, etc., Found on Said Vessels, and Inspected.

Ornamental Plants, cases	4,254
Ornamental Plants	142
Fruit Trees, cases	47

Fruit—Oranges, boxes	23,462
Limes, boxes	3,092
Apples, boxes	495
Guavas, boxes	3
Dried, and Nuts, boxes	1,001

Disposition.

Part destroyed, balance disinfected	1,537
Destroyed—Plants, cases	95
Oranges, boxes	12
Apples, boxes	69
Trees	121
Fumigated—Oranges, boxes	20,446
Apples, boxes	326
Plants, cases	599
Passed—Plants, cases	320
Trees	50
Oranges, boxes	589
Limes, boxes	3,092
Guavas, boxes	3
Rejected—Oranges, boxes	8

Inspected Within the State.

Orange Trees, 7 carloads	58,000
Fruit Trees, 202 bundles	27,150
Ornamental Plants, 55 packages	6,240
Total	91,390
Packages of specimens	156

The following is a summary of steamship inspections, from December 4, 1897, to September 30, 1898:

From China and Japan	19
From Australia and New Zealand	8
From Central America	19
From Sandwich Islands	7
From South Sea Islands	2
From Victoria	16
From Philippine Islands	2
From Mexican ports	7
Total	80

Plants, Trees, Fruit, etc., Found on Vessels and Inspected.

Ornamental Plants, cases	286
Ornamental Plants	38
Fruit Trees	520
Fruit—Oranges, boxes	114
Limes, boxes	8,591
Pomelos, boxes	4
Guavas, boxes	4
Mangoes, boxes	5
Tomatoes, boxes	2,209
Pineapples, crates	2,097
Mushrooms, boxes	100

Disposition.

Part destroyed, balance disinfected, cases	70
Destroyed—Plants, etc., cases	14
Fumigated—Plants, cases	113
Pineapples, crates	2,097
Oranges, boxes	114
Pomelos, boxes	4
Passed—Lots Plants, Trees, etc	58
Limes, boxes	8,591
Guavas, boxes	4
Mangoes, boxes	5
Pineapples (for Florida), crates	335
Mushrooms, boxes	100

NEEDS FOR THE BETTERMENT OF THE HORTICULTURAL INDUSTRY.

Advertising Fruits Abroad.—The Fruit-Growers' Convention of 1897 appointed a committee of fifty representative fruit-growers, to solicit subscriptions toward a fund to be used in holding exhibitions of California dried fruits and other products in the leading trade centers of Europe. The committee worked diligently, but, owing to the general business depression and light crops, was unable to raise the necessary amount. The educating of the people abroad regarding our products is very essential, and we appeal to the Legislature for an appropriation for at least $20,000 to be used in extending our markets and establishing remunerative prices for our products.

Deputy Quarantine Officer.—An amendment to the law should be enacted to provide a deputy to the Quarantine Officer. The duties of that officer, being now too extensive, can no longer be performed by one person.

Search for Parasites.—Ten thousand dollars should be appropriated to enable the Board to employ an expert to make a further search for parasites in foreign countries.

Appropriation.—There should be appropriated $20,000 for the uses of the Board of Horticulture, to enable it to properly pursue its work without hindrance.

Book on Resources of the State.—A book on the Resources of the State is greatly needed. In 1892 we published a report in concise form, giving a general description of every county of the State. They were distributed at the Columbian Exposition and were much sought after, as was the book on the Resources of California, published in 1893, by direction of the Governor. An appropriation of not less than $25,000 should be made to enable the Governor, with our assistance, to compile and publish a similar work, which would be of incalculable value to the State.

A Law to Prohibit Importations Infested with Dangerous Insects and Diseases.—Bills have been prepared to prohibit the entry of infested stock of any kind into the State, without giving due notice of its arrival to the proper officers, and making it a misdemeanor for its non-compliance.

FINANCIAL STATEMENT.

SACRAMENTO, CAL., September 14, 1898.

To the Honorable State Board of Horticulture of California:

GENTLEMEN: Your Executive Committee beg leave to present for your consideration the following report, which is the result of their examination of the books, accounts, and vouchers in the office of the Secretary of the Board.

First—The book of original entry, covering the period from July 1, 1897, to July 1, 1898, and the expenditure of the sum of $5,000. Every entry, being examined, clearly showed the amount paid, and for what it was paid.

Second—We attach hereto the segregation of said total sum under different heads, that the Board may have a more comprehensive idea for what the expenditures were made:

Library	$70 55
Postage	808 00
Repairing	216 89
Extra help	143 00
Miscellaneous supplies	156 32
Expressage	31 25
Experimenting	214 83
Telephone and telegraphing	106 15
Traveling expenses of Quarantine Officer	185 65
Traveling expenses of Secretary	166 85
Freight and cartage	53 08
Janitor	175 68
Salary and traveling expenses of Deputy Quarantine Officer	659 20
Clerk in San Francisco office	275 00
Furniture	90 50
Sketching	50 00
Salaries of Special Agents, and expenses	1,117 00
Traveling expenses of Commissioners	306 25
Papers	5 00
Twenty-first Fruit-Growers' Convention at Sacramento	66 70
Twenty-second Fruit-Growers' Convention at Los Angeles and Riverside	102 10
Total	$5,000 00
State appropriation	$5,000 00

Respectfully submitted.

R. D. STEPHENS, Chairman,
ELLWOOD COOPER,
THOS. A. RICE,
Executive Committee.

EXPLANATION OF PLATES OF BENEFICIAL INSECTS.

PLATE I.

Novius koebelei, ladybird imported from Australia; an effective enemy of the cottony cushion scale.

Fig. 1. Female, enlarged.
2. Larva, enlarged.
3. Male, enlarged.
4. *Rhizobius ventralis* (enlarged), ladybird imported from Australia; an effective enemy of the black scale, *Lecanium olea.*
5. Branch of olive, showing larva of *Rhizobius ventralis* at work on the black scale, natural size.
6. Larva, enlarged

PLATE II.

Fig. 1. Steel-blue Ladybird (*Orcus chalybeus*)—female, enlarged.
1a. Steel-blue Ladybird—head and prothorax, male, enlarged.
1b. Steel-blue Ladybird—female, natural size.
2. Six-spotted Orcus (*Orcus australasia*)—female, enlarged.
2a. Six-spotted Orcus—female, natural size.
3. Koebele's Ladybird (*Novius koebelei*) male, enlarged.
3a. Koebele's Ladybird—male, natural size.
3b. Koebele's Ladybird—female, natural size.
3c. Koebele's Ladybird—larva, enlarged.
3d. Koebele's Ladybird—larva, natural size.
4. Branch, with Cottony Cushion Scale and larvæ of *Novius koebelei*, natural size.
4a. Cottony Cushion Scale (*Icerya purchasi*).
4b. Larvæ of *Novius koebelei* preying upon Cottony Cushion Scale.
5. 22-spotted Leis, *Coccinella* (Leis) *conformis*, enlarged.
5a. 22-spotted Leis—male, natural size.
5b. 22-spotted Leis—female, natural size.
6. Black Scale Enemy (*Thalpochares coccophagus*) enlarged.
6a. Black Scale Enemy, natural size.

PLATE III.

Cryptolæmus montrouzieri (ladybird), an effective enemy of the mealy bug, imported by the State Board of Horticulture from Australia.

Fig. 1. Larva, enlarged.
2. Twig showing larva and pupa, natural size.
3. Perfect insect, enlarged.
4. Pupa, enlarged.

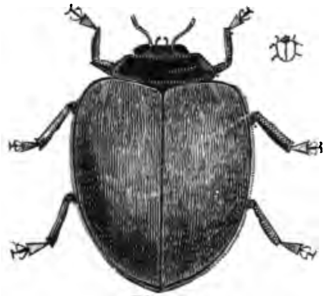


Fig. 1.

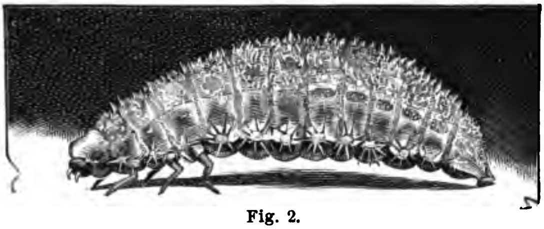


Fig. 2.

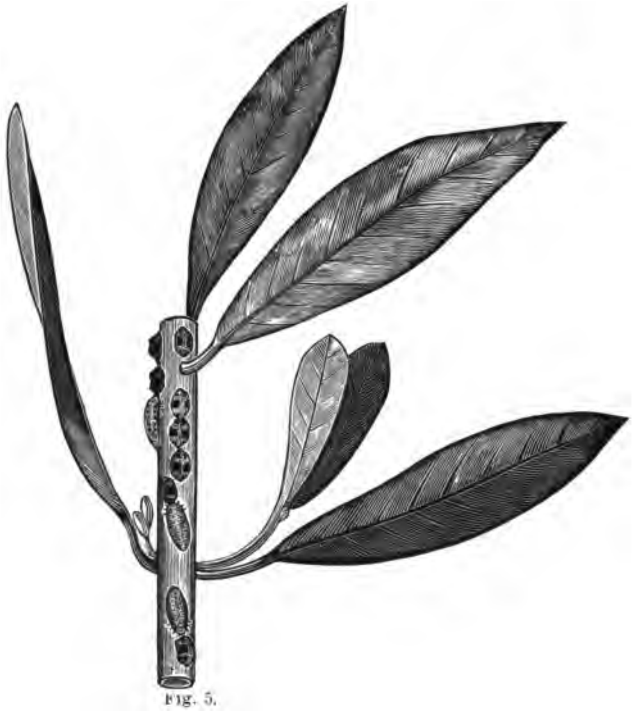


Fig. 5.

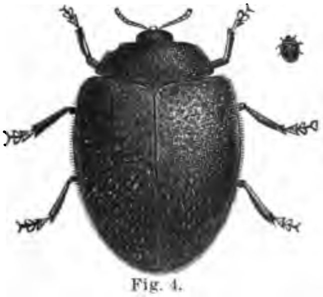


Fig. 4.

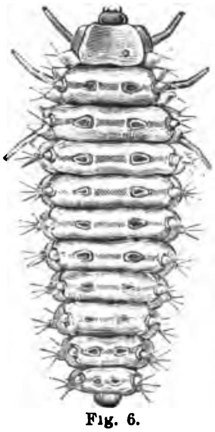


Fig. 6.

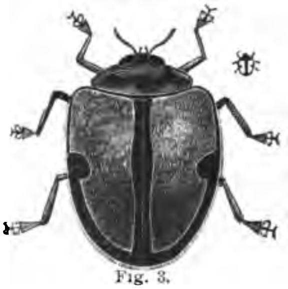
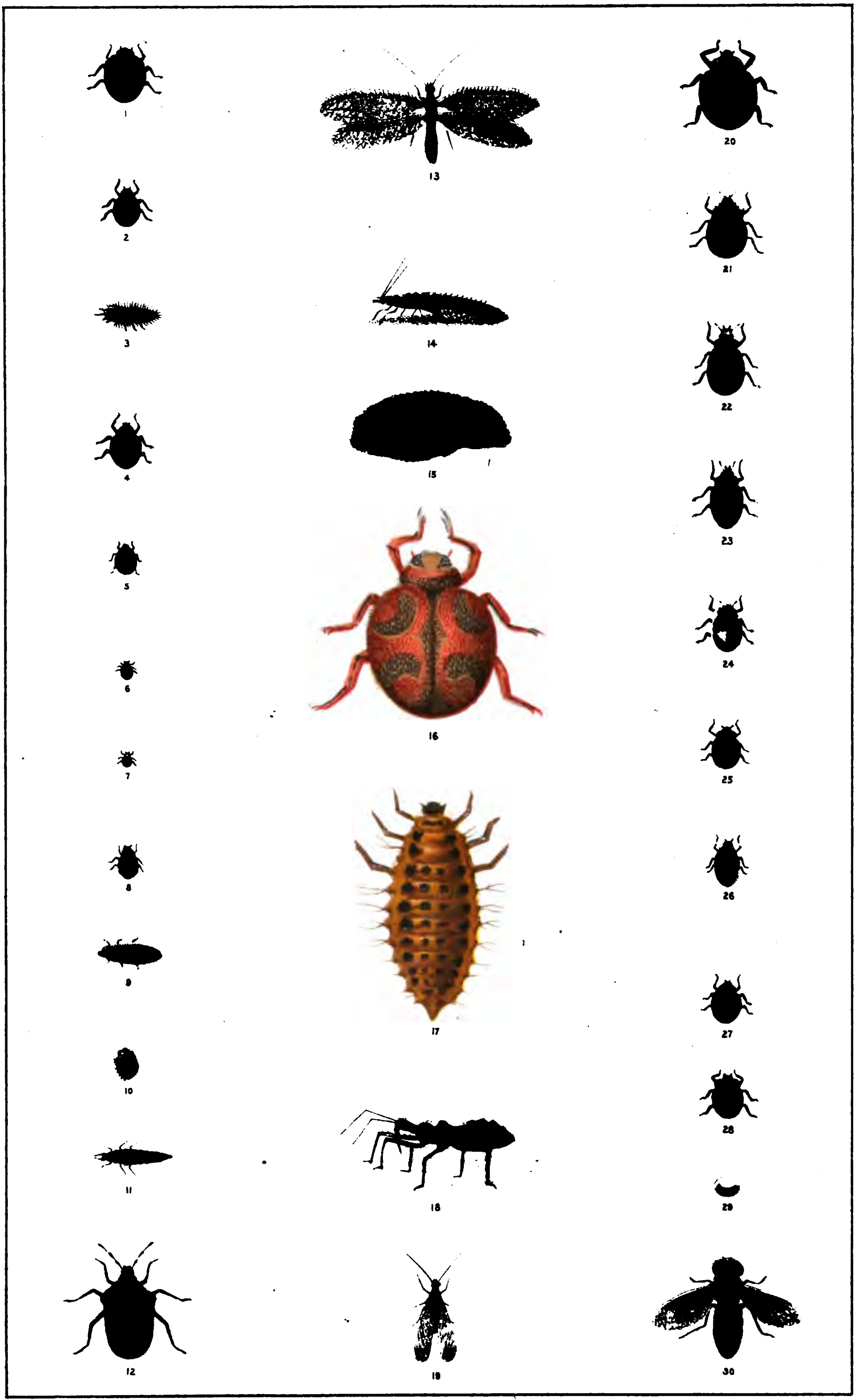


Fig. 3.

LADYBIRDS—NEWLY INTRODUCED SPECIES IMPORTED BY THE STATE BOARD OF HORTICULTURE THAT HAVE PROVED EMINENTLY SUCCESSFUL.

Plate II.



BENEFICIAL INSECTS.

H.S. CROCKER COMPANY LITH. S.F.

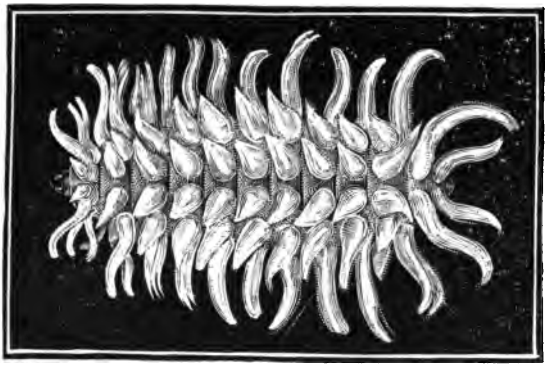


Fig. 1.

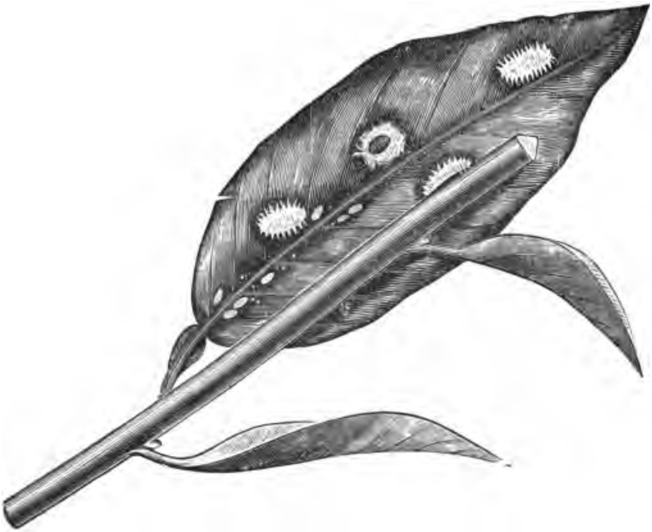


Fig. 2.

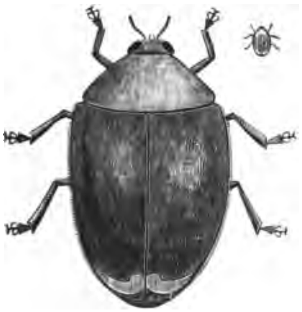


Fig. 3.

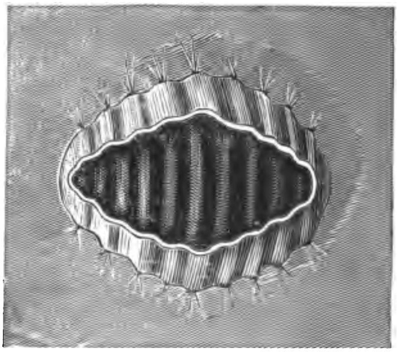
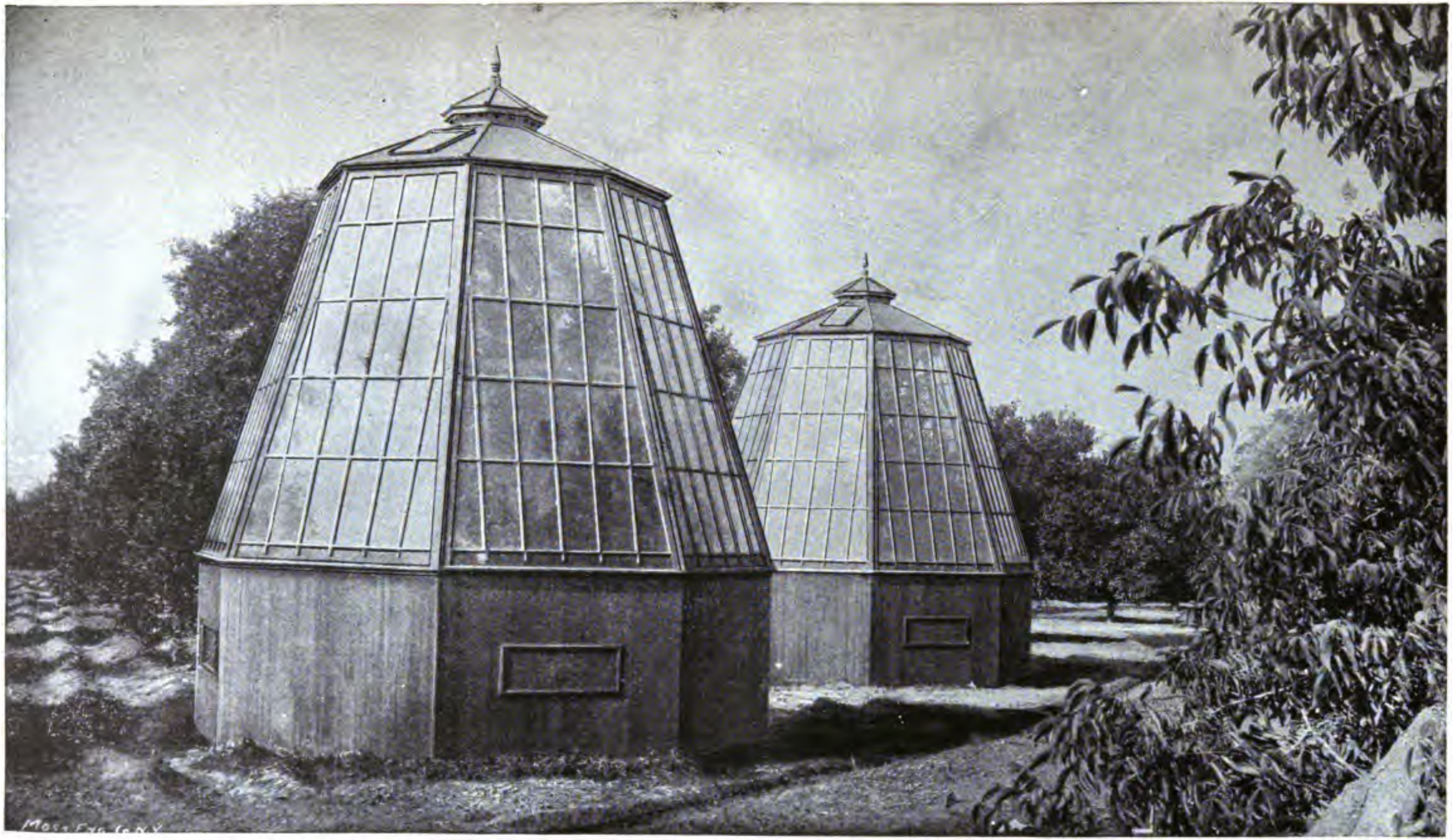


Fig. 4.

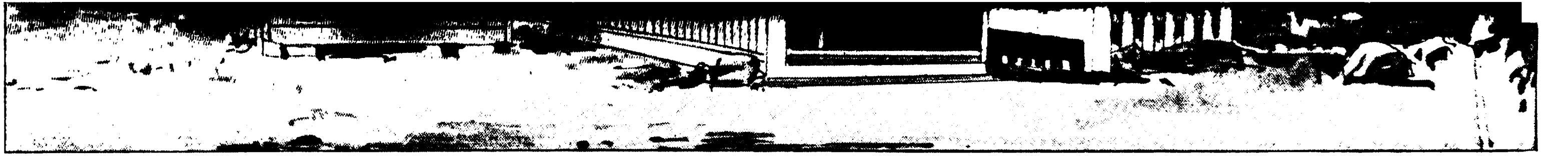
NEWLY INTRODUCED SPECIES IMPORTED BY THE STATE BOARD OF HORTICULTURE THAT HAVE PROVED EMINENTLY SUCCESSFUL.

WINTER PROTECTION FOR BENEFICIAL INSECTS.

PLATE III*a*.



Glass Houses Covering Large Orange Trees, Built by the State Board of Horticulture for the Colonization of Parasites and Predaceous Insects.
To be Moved from their Present Location at San Gabriel, to the State Capitol Grounds, at Sacramento.



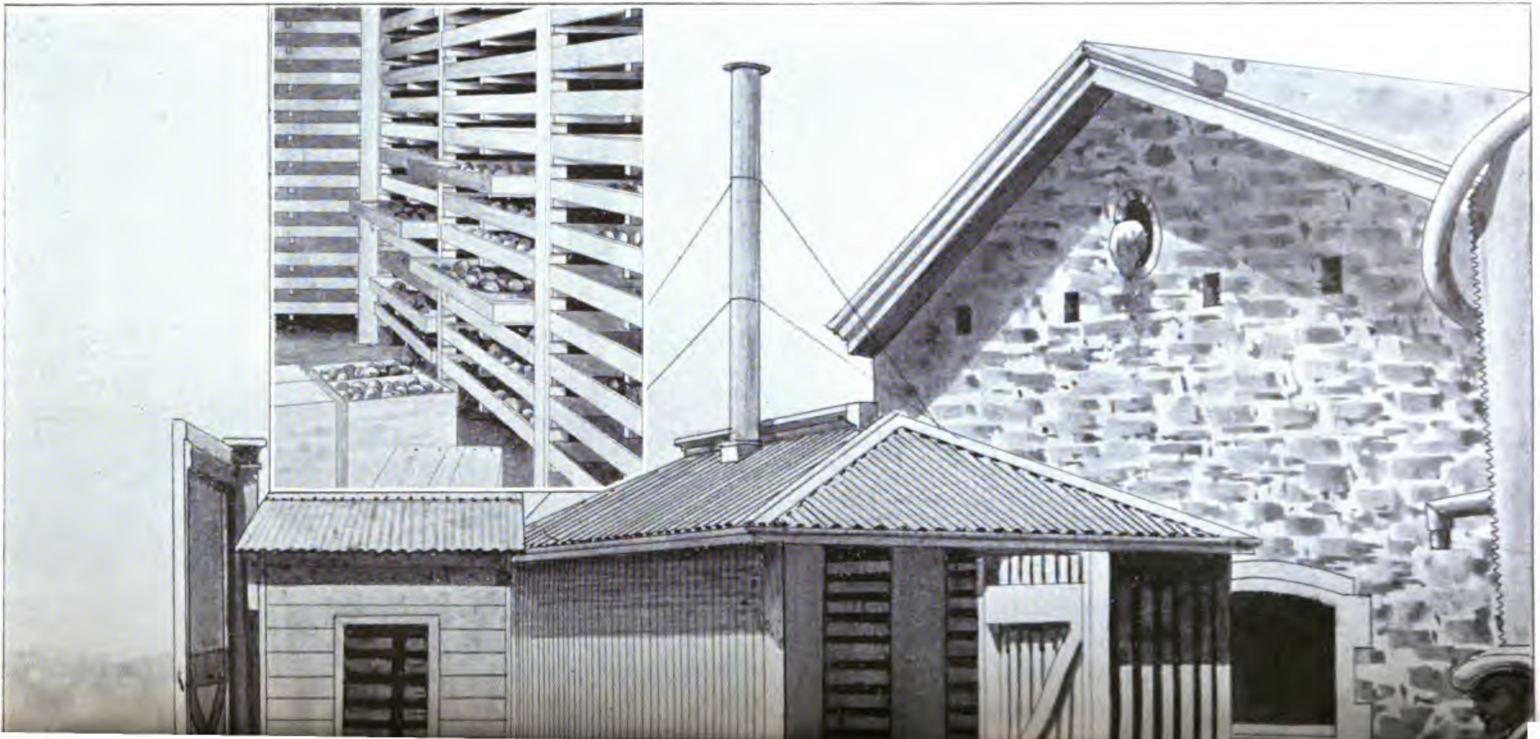
FUMIGATION BUILDING AT THE CAPE TOWN DOCK, SOUTH AFRICA. THE INTERIOR OF THE FUMIGATING CHAMBER IS SHOWN IN THE UPPER CUT ON THE LEFT.

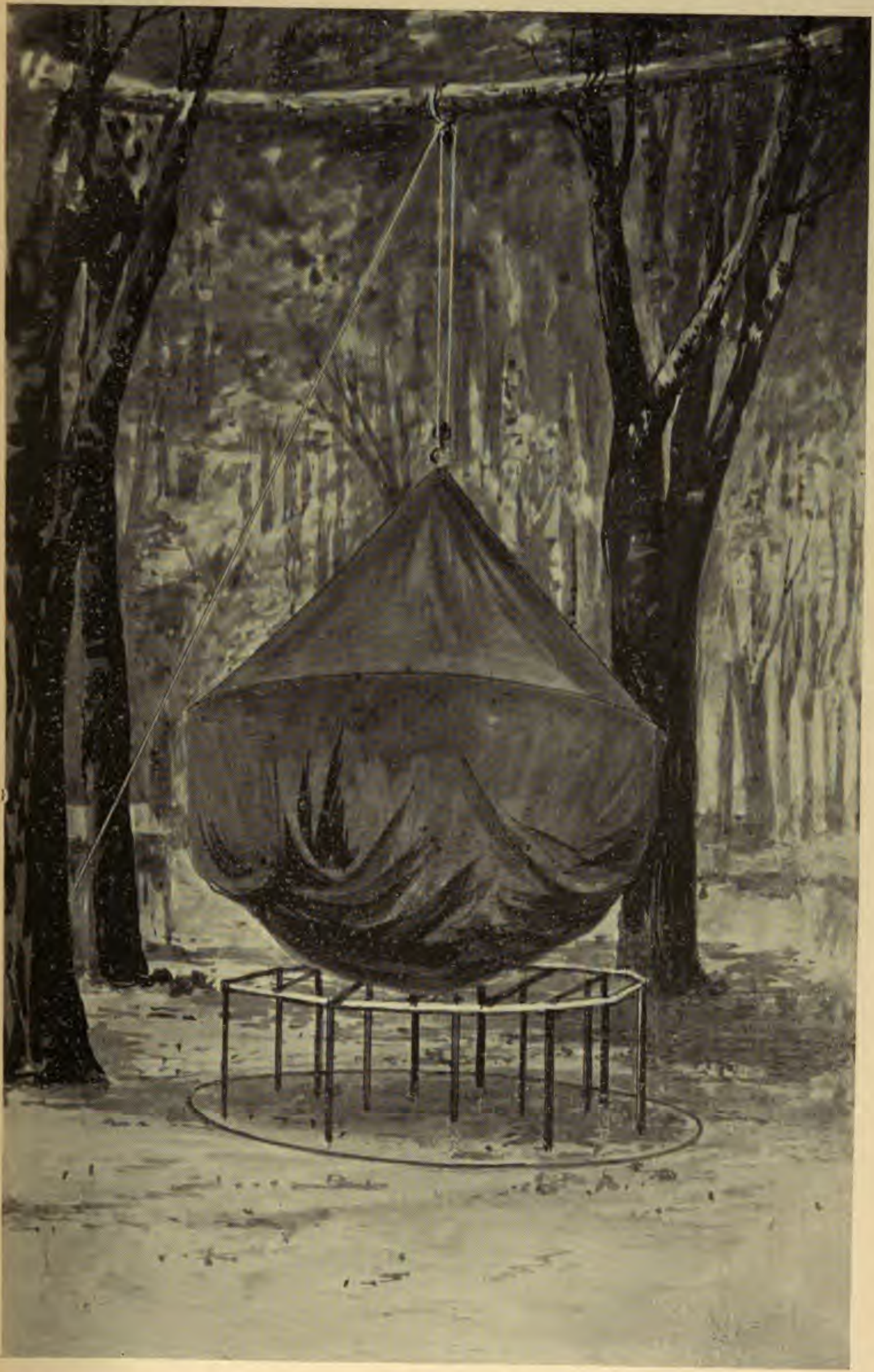
Redrawn from the Report of the Government Entomologist for 1897.

ATE V.

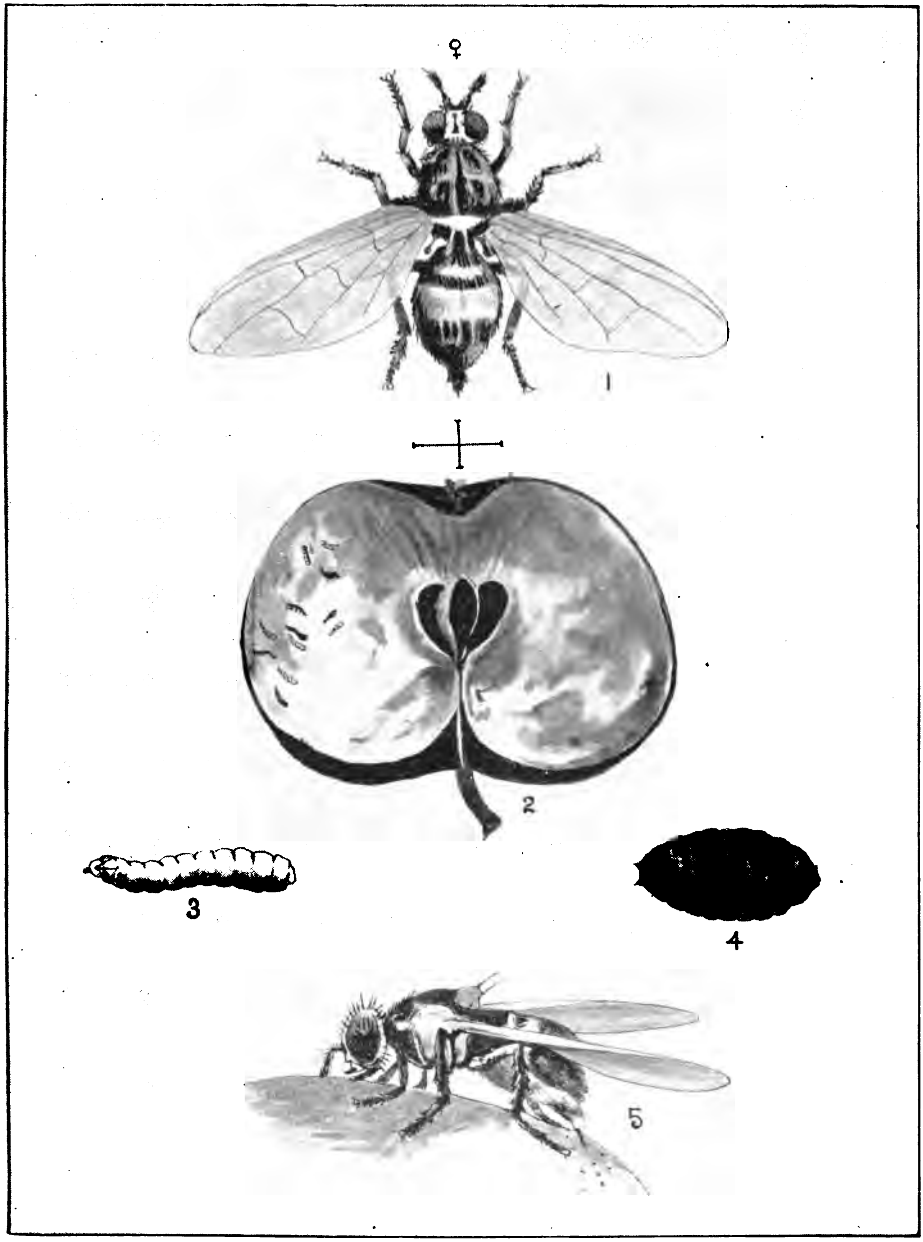
H AFRICA.

FOREIGN METHODS OF INSECT CONTROL. PLATE IV.





FUMIGATION TENT FOR NURSERY STOCK, AT FERNWOOD, NEWLANDS, SOUTH AFRICA.
THE TREFS ARE STOOD IN THE FRAME AND THE TENT LOWERED OVER THEM.
Redrawn from the Report of the Government Entomologist for 1897.

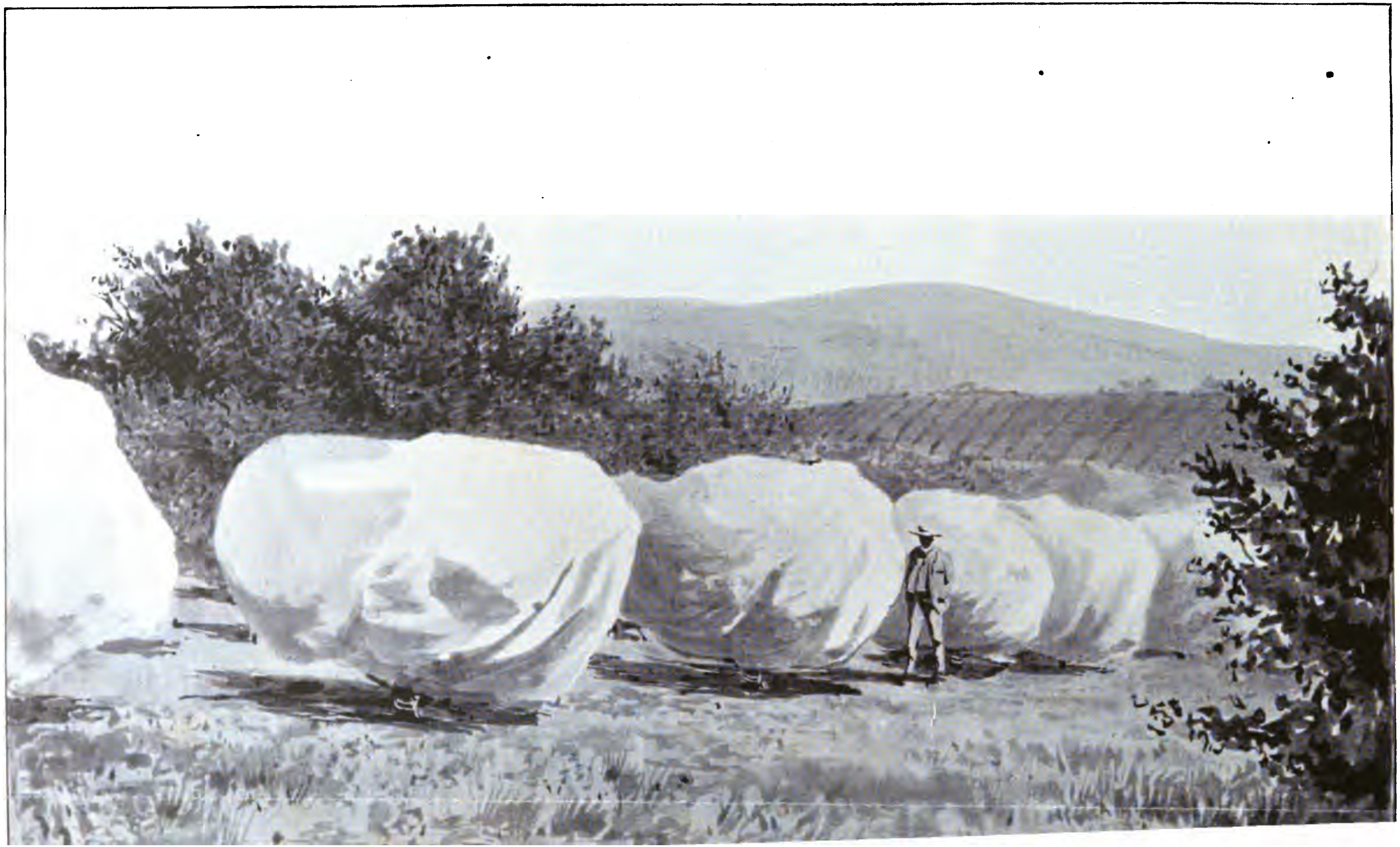


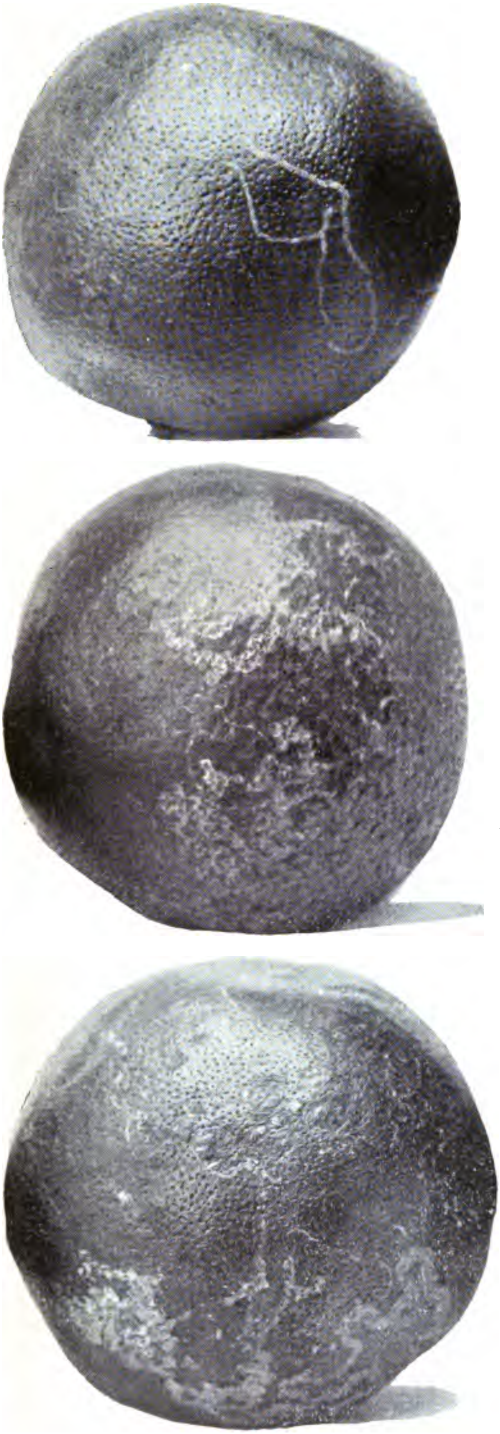
THE QUEENSLAND FRUIT FLY—TEPHRITIS TRYONI.

Fig. 1—The fly, enlarged. Fig. 2—Section of Apple infested by Maggots, natural size. Fig. 3—Maggot, enlarged. Fig. 4—Pupa, enlarged. Fig. 5—The Fly in the Act of Depositing Eggs in the Apple, enlarged.

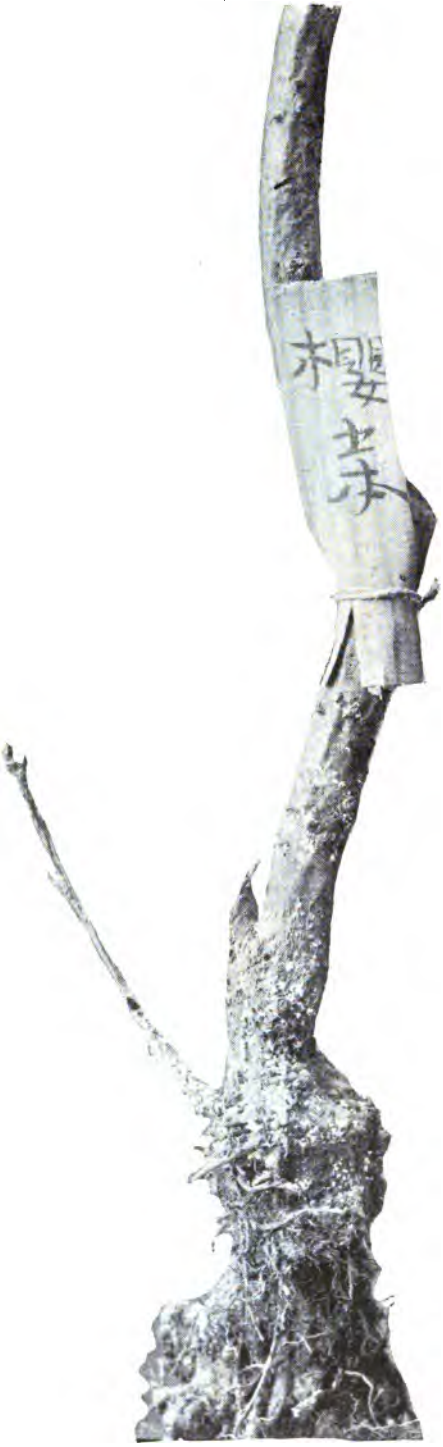
Redrawn from the Town and County Journal, of New South Wales, of May 7, 1898.

PLATE VII.

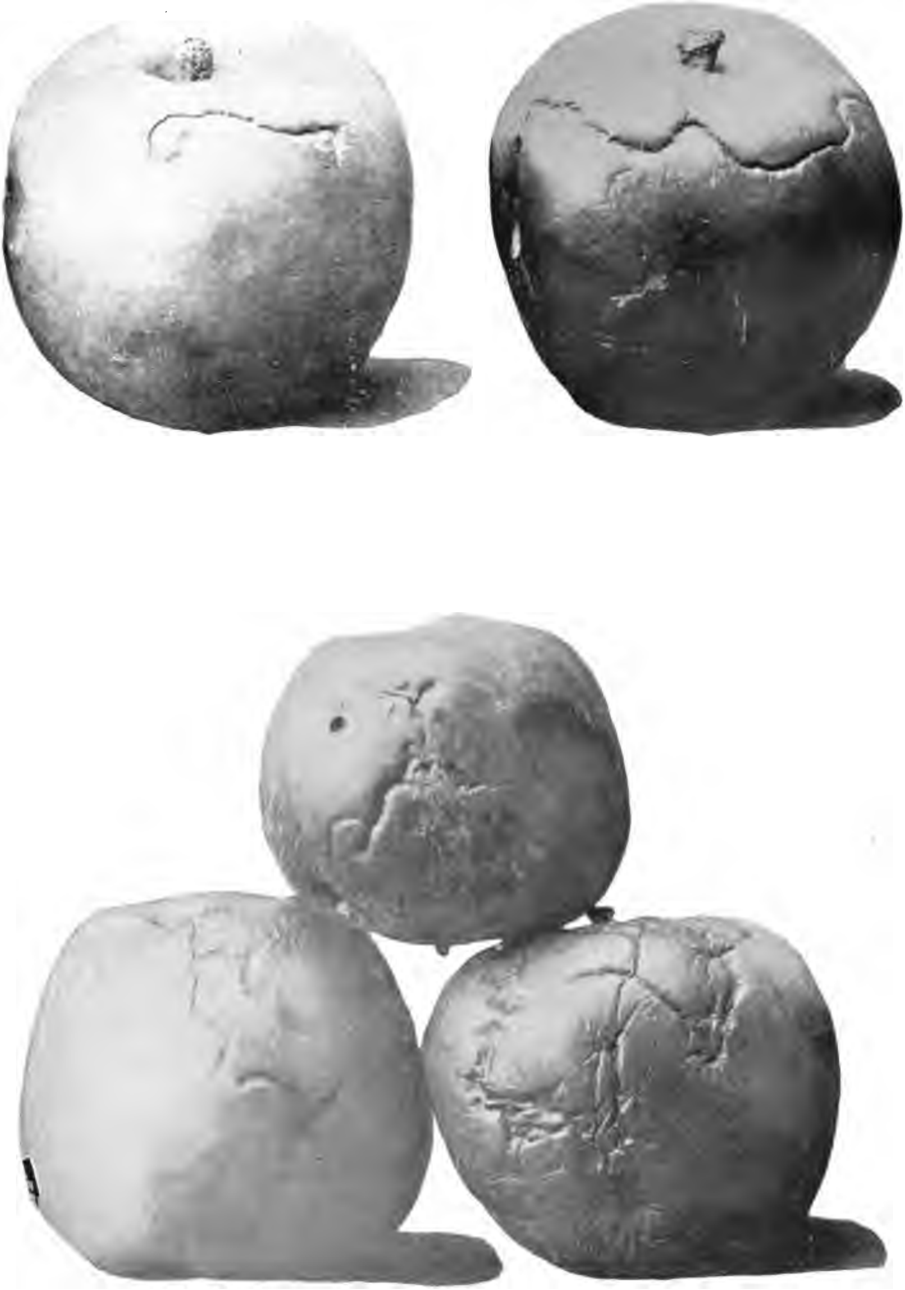




SPECIMENS OF ORANGES TAKEN FROM A CARGO THAT ARRIVED AT SAN FRANCISCO FROM CENTRAL AMERICA, INFESTED BY A "SKIN MINER." ENTIRE CARGO DISINFECTED.



SAMPLE OF CHERRY TREES FROM JAPAN, INFESTED WITH THE JAPANESE SCALE (DIASPIS AMYGDALI), AN INSECT WHICH IS IMPOSSIBLE TO DESTROY WITH INSECTICIDES. AN ENTIRE SHIPMENT WAS REFUSED LANDING—DESTROYED.



SAMPLES OF APPLES FROM AUSTRALIA INFESTED WITH THE "APPLE MINER" (DOTICUS PESTILENS). QUARANTINED AT SAN FRANCISCO AND ENTIRE CARGO DESTROYED.

REPORT

OF

B. M. LELONG,

Secretary of State Board of Horticulture, and
Chief Horticultural Officer.

REPORT OF B. M. LELONG,

Secretary of State Board of Horticulture, and Chief Horticultural Officer.

REVIEW OF FRUIT SEASONS, 1897–98.

CLIMATIC AND CROP CONDITIONS, 1898.

The fruit season of 1898 stands out as one of the fortunate years for all classes of California agriculture, and while the orchardists of the State, as a rule, have not suffered so severely as the grain farmers and stock-raisers, it cannot be classed as one of their prosperous years. This condition is due to a series of unfavorable meteorological phenomena; an unusually dry season for the winter of 1897–98, very low temperature during the budding and blossoming season in many of the principal fruit sections, followed by severe winds when the young fruit was forming, The result of this combination was an almost total failure of many varieties of fruit in some sections. The records of the Weather Bureau show that the past season was the driest of which there is any account. There are few if any places where the season's drought is unprecedented. In some places many years have been drier, but no one year has been drier than this in every section of the State. Taking the State as a whole, the total rainfall was little over one half that of a normal season. In Southern California only one third of a normal season's rainfall occurred. The result of these unfavorable conditions is seen in reports received at this office in relation to the fruit crop. These are all to the effect that it is "spotted." In some sheltered localities, on land retentive of moisture, or where irrigation could be resorted to, crops are reported as good, others as fair, while many are total failures. Altogether the output of the State for the present season will fall very far below normal, and the total shipments, which should have exceeded 36,000 cars, will not probably reach over 30,000. Apricots have been almost a total failure. A few orchards have had good crops, but the total output of the State will not exceed one twelfth to one tenth of a normal yield. Apples will return very nearly a full crop. Peaches, medium to poor; pears, good crop. Plums and prunes, fair. Placer County reports a very large crop of fruit of all kinds; in fact, one of the best ever produced there, while Sonoma, Napa, and Butte counties all report fair returns. Small fruits gave better returns. The cherry crop was very heavy, while the berry yield was unusually good. Almonds have been a very light crop, a complete failure in most parts, while the walnut crop of Southern California will be about equal to any previous year. Early indications gave rise to the belief that it would be the largest walnut crop ever known, but two weeks of severe hot weather in August and September caused sun-burn damage, and at present writing the extent of the mercantile crop is problematical, although it will at least equal that of last year. The orange crop was full, but a severe frost early in the year did much damage in exposed sections and caused a heavy reduction in the market price.

While there has been a heavy shortage in the deciduous fruit crop, there has been a large increase in prices, and growers as a rule will not suffer so severely from the shortage. In some cases where the shortage was very heavy the increased price cannot compensate for the loss, but in many cases growers have had both good crops and good prices.

Despite the low prices which have prevailed in the past few years, the interest in fruit culture has not abated, and very extensive additions to the orchard area of California are being made by new plantings each year. Citrus fruits are still the favorites, with olives, prunes, and peaches following. The rapidly and steadily-growing export trade in fruit each year shows that fruit culture is, and will be for many years, if not for all time, the greatest commercial industry of our State.

COMPARATIVE FIGURES FOR FIRST HALF PRESENT YEAR.

It was feared early in the season of 1898 that there would be an enormous shortage, almost a total failure, of the fruit crop, but as the season advanced the shortage was reduced until at the end we have reached almost our usual exports. It is true that with the large number of new orchards coming in each year the output of the present season is far below what it should be in a normal year, but the figures show that even in a poor year California does not fall far below in her contribution to the nation's fruit supply. Up to September 28th of the present year there had been shipped over the lines of the Southern Pacific Railroad Company 4,033 cars of fresh deciduous fruits, against 4,590 for the same period in 1897; a shortage of 557 cars. The very large demand for canning may account partly for this falling off; the rest must be credited to the short season. For the first six months shipments of fruit north of Tehachapi over the lines of the

Southern Pacific were as follows, as compared with corresponding months in 1897:

Kind.	January.		February.		March.		April.		May.		June.	
	1898.	1897.	1898.	1897.	1898.	1897.	1898.	1897.	1898.	1897.	1898.	1897.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Canned goods	1,405	1,286	978	1,136	767	1,209	1,530	1,592	1,452	1,592	1,495	1,280
Fruit, dried	4,204	1,417	2,682	2,002	4,415	3,154	2,807	1,985	2,293	921	586	509
Fruit, citrus	373	38	40	14	14	12	------	------	15	10	------	-----
Fruit, fresh	595	49	146	16	254	13	24	------	1,280	1,276	9,134	7,348
Raisins	2,577	1,355	2,015	949	1,981	753	894	486	1,241	585	326	592
Nuts	80	26	101	13	56	14	11	17	14	13	------	-----
Totals	9,234	4,171	5,962	4,130	7,487	5,155	5,266	4,080	6,295	4,397	11,541	9,729

Grand total, 1898	45,785 tons.
1897	31,662 tons.
Increase	14,123 tons.

GROWING IMPORTANCE.

The increase of 14,123 tons in the shipments of fruits from Northern California in the first six months of the present year is creditable to last year's crop, and consists largely of canned and dried fruits, nuts, and raisins, but the showing is a good one in the line of fresh and citrus fruits for a dry year.

The growing importance of the fruit interests of California are shown in the following tables, for which we are indebted to the State Board of Trade:

General Summary and Comparative Tables of Shipments by Rail and by Sea of Fruits Wine, Brandy, and Vegetables for Eight Consecutive Years.

Tons of 2,000 pounds.

Kinds.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.
Green deciduous	34,042.0	50,548.9	59,374.5	80,112.3	90,692.2	66,254.8	57,638.3	72,350.2
Citrus fruits	34,209.6	46,921.4	34,857.5	80,757.0	58,964.0	115,825.5	99,156.0	98,547.0
Dried fruits	32,297.5	32,919.0	29,762.2	45,386.2	51,828.2	61,386.4	48,522.8	75,159.7
Raisins	20,560.1	22,779.1	26,673.4	37,409.9	46,954.4	46,390.1	34,434.6	39,065.8
Nuts	787.1	1,358.9	2,061.9	1,796.5	3,953.5	3,234.7	4,972.6	5,808.6
Canned fruits	40,060.9	32,395.0	55,273.7	31,626.3	60,352.6	41,395.5	45,546.9	73,464.7
Carloads fruit by rail and sea	16,195.7	18,692.2	20,800.3	27,708.8	31,274.4	33,547.2	29,026.7	36,439.6
Carloads vegetables by rail	*	*	*	6,978.4	4,276.6	3,613.6	1,130.6	4,243.8
Carloads vegetables by sea	*	*	*	*	410.0	40.0	487.7	490.8
Carloads wine and brandy by rail and sea	*	4,765.1	4,832.5	6,620.9	7,663.5	8,056.8	7,609.0	6,897.8
Carloads fruit, vegetables, wine and brandy by rail and sea	16,195.7	23,347.3	25,632.8	40,928.5	43,624.7	45,257.4	38,254.0	48,072.0

* None reported.

Gains and losses, 1896 and 1897 compared:

Carloads.	1896.	1897.	Gain.	Loss.
Green deciduous	5,763.8	7,235.0	1,471.2	------------
Citrus fruits	9,915.6	9,854.7	------------	60.9
Dried fruits	4,852.2	7,515.9	2,663.7	------------
Raisins	3,443.4	906.5	463.1	------------
Nuts	497.2	580.8	83.6	------------
Canned fruits	4,554.6	7,346.4	2,791.8	------------
Vegetables	1,618.3	4,734.6	3,116.2	------------
Wines and brandy	7,609.0	6,897.8	------------	711.2
Total	38,254.1	48,071.7	10,589.7	772.1
Net gain, carloads	------------	------------	9,817.6	------------

DECIDUOUS FRUIT SHIPMENTS.

Cars of fresh deciduous fruit shipped each month during the seasons of 1897 and 1898, as reported by the California Fruit Growers' and Shippers' Association:

	1897.	1898.
Cars shipped in May	106	104
Cars shipped in June	575	744
Cars shipped in July	1,287	1,204
Cars shipped in August	1,591	1,111
Cars shipped in September	1,107	895
Cars shipped in October	496	------------
Cars shipped in November	164	------------
Total cars	5,326	4,058

Number of cars of each variety of fruit shipped during 1895, 1896, 1897, and 1898:

	1895.	1896.	1897.	1898.
Pears	1,187	1,624	1,640	1,502
Peaches	1,289	976	1,316	1,097
Grapes	1,010	712	1,100	376
Plums	468	407	742	542
Apricots	162	172	177	123
Cherries	180	83	239	297
Apples	105	53	61	106
Quinces	13	8	24	1
Figs	5	2	3	0
Nectarines	0	1	10	0
Persimmons	0	0	2	0
Mixed	152	9	12	14
Total cars	4,568	4,047	5,326	4,058

In relation to the above tables, Mr. H. Weinstock, President of the California Fruit Growers' and Shippers' Association, writes:

"The foregoing report shows that there were shipped out of the State, up to October 1, 608 cars less than up to the corresponding date of 1897.

"When it is remembered that immediately after the serious frosts in March and April, and the continued and unprecedented drought, it was predicted that the fruit crop of the State was a total failure and that there would be practically no fruit for shipment, it is gratifying to find that the shipments, up to October 1, have fallen only about 13 per cent short of the shipments of '97.

"When it is further remembered that the prices realized, not alone for Eastern shipments, but also for the fruit sold at home to canners and in the local markets, were from 20 to 100 per cent more than last year, it must be evident that the net returns on fresh deciduous fruits to the fruit-growers of the State, despite the diminished output, must, on the whole, be much in excess of last year."

NEW MARKETS OPENING UP.

It has been feared that, with our constantly increasing output of fruit and fruit products, our markets would be narrowed within the limits of profit, and that overproduction and loss would result. This danger is removed by the rapidly growing population of our own country, which requires more fruit each year and which will increase its demands as better means of distribution are had.

A new field, and somewhat unexpected one, has opened for our fruits in Europe, which we have looked upon in the light of an exporter and a rival rather than as an importer and customer. For the first seven months of the present year we exported, among other fruits, California fruit products of the following values, largely to European points:

Oranges	$324,977
Prunes	245,619
Raisins	846,342

Besides these, we shipped canned goods, apples, nuts, and other fruits in large quantities. As showing the increase of our principal fruit exports, the following comparison is made of the past two years:

Fruit Exports for July, 1897–98.

	1897.	1898.
Oranges	$3,561	$29,836
Prunes	7,265	1,875
Raisins	2,030	3,167
Totals	$12,856	$34,878

Exports of Fruit from the United States for the twelve months ending June 30, 1897-98.

Articles.	1897.		1898.	
	Quantity.	Value.	Quantity.	Value.
Apples, dried, lbs.	30,775,401	$1,340,159	31,031,254	$1,897,725
Apples, fresh, bbls.	1,503,981	2,371,143	605,390	1,684,717
Oranges				339,396
Prunes			15,940,791	1,021,881
Raisins			3,109,639	167,062
All others		2,172,199		2,033,845
Preserved and canned		1,729,999		1,707,245
Nuts		125,805		161,432
Totals		$7,739,305		$9,013,310

Until July, 1897, oranges, prunes, and raisins were classed under "all other fruits," not being separately enumerated. Therefore, there are no returns shown for 1897, and those for 1898 show the exports for eleven months only.

Imports of Fruit into the United States for the twelve months ending June 30, 1897-98.

Articles.	1897.		1898.	
	Quantity.	Value.	Quantity.	Value.
Bananas		$4,086,320		$4,236,418
Currants	29,265,761	596,084	25,186,010	837,987
Dates	11,847,279	284,056	13,561,434	371,992
Figs	8,940,762	535,380	9,624,391	508,998
Lemons		4,043,822		2,848,124
Oranges		2,324,907		886,695
Plums and prunes	710,028	73,303	303,917	39,655
Raisins	12,650,598	567,039	6,593,823	381,887
Preserved fruits		605,053		922,325
All others		1,810,807		1,394,255
Totals		$14,926,771		$12,328,936

CALIFORNIA FRUIT IN EUROPE.

The European market is a wide one, and offers us a large field for our surplus fruit products. To reach it, however, especial care must be taken both in selecting and packing, for only the best fruit, put up in the most attractive manner, can hope to gain a permanent footing here, and an endeavor to make it a dumping ground for refuse that cannot be disposed of at home may lose it to us forever. Regarding shipment of our fruit to England last summer, Messrs. Lumley Bros., of Porterville, publish the following communication from Garcia & Jacob of Covent Garden, London:

"It is some time since we have had the pleasure of addressing you; and in the interim the California trade to London in pears, plums, and peaches has greatly developed. It will be a satisfaction for your readers to know that the California fruit is held in greater estimation than ever on our markets, and in consequence of the short crop of English and continental fruit, it has been possible to realize prices sufficiently high to be remunerative to the shippers. The senders have been Porter Bros. Company, Earl Fruit Company, and Mr. A. Block. The care and attention bestowed on the consignments has been such that they have arrived on the London market in even better condition than the fruit that comes from a distance of about two to twenty miles of London. It seems difficult to believe that the plums and pears, after having traveled nearly seven thousand miles, should be landed here with the bloom of them as if they had been only just plucked from the trees. Whether regular shipments can be made in the future will depend in a great extent on the incidental expenses. Of course, every season is not like the present one; and, should there be a large crop of English or French fruit, the prices of Californians would necessarily suffer. Whether the freight from California to New York can be reduced is another question; in the event of its being brought down to a reasonable figure, there would be a greatly increased demand for California fruit on the English markets, and what is now regarded as a luxury would become almost a necessity.

"The principal thing to be feared is that without a reduction of freight, the realization here may not be sufficiently high to be remunerative to the shippers. It must, however, always be borne in mind that the cultivation of fruit in California is increasing yearly, and that it will be necessary to seek fresh fields and pastures new as an outlet for this produce.`

"In the development of this trade, the American Line, and the Southwestern Railway Company have put forth their best efforts; and a record of quick delivery was made by the St. Paul, bringing 5000 packages, which left New York, landed at Southampton, and were in our warehouse ready for sale within seven days and four hours. All seem anxious to develop this business, as they know that the fruit is much appreciated here.

"The orange season is now approaching, and there are already inquiries for the Navel orange, or, as we prefer to term it, the 'seedless orange,' a more appropriate and better sounding title. The expenses incurred in the transmission of these make the prices so high that only the well-to-do are able to purchase them. If they come here in moderately large quantities and in good condition, fair prices will be maintained. Of course, when there is only a small quantity on the market, the results are higher than when the supply is large."

Fruit Exports to Foreign Countries for 1897-98.

Country.	1897.	1898.
United Kingdom	$3,683,777 00	$3,415,616 00
France	361,380 00	747,389 00
Germany	1,080,304 00	1,644,723 00
Other Europe	1,087,809 00	1,195,547 00
British North America	750,752 00	1,202,998 00
Central America and Honduras	58,976 00	35,716 00
Mexico	72,654 00	58,513 00
Santo Domingo	2,388 00	1,394 00
Cuba	46,745 00	38,175 00
Puerto Rico	4,123 00	2,348 00
Other West Indies and Bermuda	58,894 00	56,096 00
Argentina	4,610 00	9,853 00
Brazil	11,528 00	11,751 00
Colombia	9,472 00	10,517 00
Other South America	35,496 00	23,892 00
China	18,119 00	31,785 00
British East Indies	13,175 00	12,853 00
British Australasia	311,625 00	293,757 00
Other Asia and Oceanica	109,734 00	129,279 00
Africa	79,740 00	90,261 00
Other countries	204 00	847 00
Totals	$7,739,305 00	$9,013,310 00

That there is yet an unsupplied home market for fruit and fruit products as that are or can be produced in California, is shown by the fact that in 1897 the United States paid out for the following imported fruits $13,143,642 08:

Fruit and Fruit Products Imported into the United States in 1897.

Article.	Amount Pounds.	Value.
Plums and prunes	736,987	$74,165 46
Raisins	11,917,756	532,554 00
Zante currants	28,218,176	572,803 00
Figs		532,974 50
Oranges		3,341,646 64
Lemons		4,025,354 49
Limes		28,700 29
Lemon and orange oil	304,270.90	270,023 82
Lemon and sour orange juice		74,848 00
Orange and lemon peel		28,466 00
Grapes	170,864.51	374,440 03
Olives		328,430 84
Olive oil in casks, gallons	525,630	220,903 00
Olive oil in bottles	945,828	1,146,494 52
Almonds	4,196,609	244,408 07
Almonds, shelled	5,798,354	683,446 34
Sweet almond oil	86,594	19,059 59
Bitter almond oil	10,472	12,029 00
Filberts and and walnuts	12,827,174	632,858 99

GERMANY'S RESTRICTIVE METHODS.

The action of Germany and other European nations in relation to fruit infested with the pernicious scale, or showing the effects of drying on zinc trays, has been condemned by a large part of our press as a retaliatory measure. It is probably only a wise protective measure on the part of European nations, and will not at all affect our market there, but will have the effect of making our shippers more careful in selecting their fruit, and the growers more careful of their orchards. That this order has not seriously affected our export trade in fruit is shown by the fact that our shipments to that country are constantly increasing. For the first seven months of the present year (1898) we sent Germany fruit of the value of $570,440, as against $464,902 for a corresponding period of 1897, and $279,540 in 1896. Inasmuch as California exports principally prunes and cured fruits to Germany, and these are not cured on zinc trays or troubled with the pernicious scale, the order will not affect California. The German government was advised by this Board that any scale found on the fruit is destroyed during the operation of curing, and therefore no ground for fear should exist.

For instance, to cure prunes, the fruit is dipped into a strong solution of lye, to break the skin of the fruit and to hasten drying. After being dried they are dipped in boiling water, and are then piled into a heap to set the color and reduce the toughness of the skin. No insect can withstand this treatment, and therefore no live scale insects can ever be found in dried fruit.

UNSUPPLIED HOME DEMAND.

Besides a wide and increasing foreign market, we have still an unfilled home demand, and that there is yet an ample home market for California fruit if it could be easily and cheaply reached, is further evident when the one city (New York) consumes and distributes annually fruit to the value of $23,400,000, as is shown by the fruit sales in that city for 1897:

New York Fruit Sales, 1897.

Sicily lemons	$4,000,000
Bananas	4,000,000
Domestic grapes	200,000
Deciduous fruits	1,500,000
Almeria grapes	500,000
Jamaica oranges	300,000
California oranges	1,200,000
Florida oranges	100,000
Pineapples	250,000
Figs	500,000
Currants	500,000
Dates	250,000
Prunes	100 000
Raisins	500,000
Apples	4,500,000
Peaches	1,000,000
Berries of all kinds	2,500,000
Melons	1,000,000
Other varieties of fruits	500,000
Total	$23,400,000

SOUTH AMERICAN AND CHINA TRADE.

In addition to her markets in the East, California has very extensive markets for her fruits in the West, and heavy shipments are made to Central and South America, Australia, China, Japan, Alaska, and the

Islands. In the first seven months of this year there was shipped to the following points, fruit, principally from California, of the values given:

China	$16,857
East Indies	7,567
Hongkong	21,842
Australasia	78,868
Asia and Oceanica	46,584

TOTAL EXPORTS BY SEA COMPARED.

While the greater part of our fruit finds its way to market overland, there is still a very large portion shipped by water. The larger portion of the wine and brandy output is shipped by ocean freight to the Eastern seaboard and European points, but the other fruit products find a market principally in the Orient and the Islands, although a very considerable trade in apples and canned goods is done with Central and South American points. Fruit exports for 1896 and 1897 from San Francisco are as follows:

Exports by Sea from San Francisco.

	1896.		1897.	
	Quantity.	Value.	Quantity.	Value.
Apples, dried, pounds	11,250	$404	77,350	$4,949
Apples, fresh, barrels	18,803	42,466	18,244	39,578
Fruits, canned		1,201,609		1,103,688
Fruits, all other		123,693		148,838
Nuts		10,445		6,495
Brandy, gallons	42,504	40,861	2,720	3,760
Wine, bottles, qts. doz.	12,196	49,876	12,757	51,393
Wine, gallons	944,602	395,908	786,930	313,161
Totals		$1,865,262		$1,671,862

OUR FAMOUS PRUNE INDUSTRY.

The California prune still maintains its position in the front ranks of our cured fruit industry. Whatever the season, wet or dry, hot or cold, we may depend upon a good prune crop. Other fruits may fail, or give a heavy shortage, but the prune is always a faithful bearer. The past season with its many drawbacks has not been an exception to the rule, and while the prune crop is not so heavy as it would have been had the conditions been more favorable, it will reach very nearly the usual amount, something in excess of 75,000,000 pounds. Over the State the crop is spotted, in some locations very good and in others poor, but a number of young orchards are each year coming into bearing, and these will do much this season to keep up the full figure of the prune crop despite unfavorable climatic conditions.

Following are the products by years for the past nine years:

Year.	Pounds.
1890	16,000,000
1891	27,500,000
1892	22,500,000
1893	52,180,000
1894	44,750,000
1895	64,750,000
1896	55,200,000
1897	95,000,000
1898, estimate	75,000,000

These figures show a steadily increasing output of prunes, with a slight decrease in the unfavorable seasons. With the increase in the output of our domestic fruit there has been a corresponding decrease in imports, as shown by the following figures:

Receipts of Foreign Plums and Prunes.

Year.	Quantity. Pounds.	Value.
1891	41,012,571	$2,139,215 00
1892	10,374,874	496,078 72
1893	23,225,821	1,049,896 48
1894	8,749,349.5	413,769 51
1895	15,311,695	533,748 21
1896	852,944	71,512 54
1897	736,987	74,165 46

With the increase of our domestic prunes and the decrease in importations of foreign fruit, the California prune, by reason of its superiority, has forced its way into the foreign market, and is now found in Germany, France, and England, where a new and steadily increasing demand for our fruit is found, which assures us a fairly profitable overflow market and removes the danger of overproduction. Our exports of prunes for the first seven months of 1898 were 3,945,753 pounds, valued at $245,619. The export trade during the past few years has been stimulated by low prices, and has this year been augmented by the failure of European crops. The introduction of our prunes in Germany has opened a wide market for us, and that country, which formerly supplied its wants from France, is now looking to California for its fruit. Only the best fruit will do for this market, and packed in the neatest manner.

From Santa Clara County, the principal prune center in the State, there were exported to foreign countries for the six months ending December 31, 1897, prunes to the amount of 6,922,000 pounds, as follows:

Prune Shipments from San José.

Destination.	Pounds.
London, England	2,010,160
Liverpool, England	245,975
Hamburg, Germany	1,508,140
Bremen, Germany	310,670
Helsinfers, Germany	57,240
Berlin, Germany	9,200
Antwerp, Belgium	598,760
Paris, France	111,830
Havre, France	1,007,085
Bordeaux, France	24,050
Rotterdam, Holland	493,875
Copenhagen, Denmark	17,330
Glasgow, Scotland	67,880
Wiborg, Finland	30,200
Winnepeg, Manitoba	144,250
Toronto, Canada	138,985
Montreal, Canada	146,370
Total	6,922,000

PRUNE CROP—CONDITION, 1898.

The prune output of Santa Clara County this year will be about 50,000,000 pounds, and of fair to good quality. In some of the foothill sections the crop has been very good, while prices are better than for several years past, there having been a general advance for the larger sizes. Prices for prunes in sacks for September, 1897–98, are as follows:

Sizes.	1897.	1898.
40 to 50	5¾c	6½c
50 to 60	4¾	5
60 to 70	4¼	4
70 to 80	3¾	3½
80 to 90	3¼	3¼
90 to 100	2¾	2¾

The condition of the prune yield for 1898, as reported from the principal prune-growing counties, is indicative of the whole fruit crop of the State, and is decidedly "spotted." Shasta County, full crop; Tehama, poor; Lake, full; Sutter, medium; Napa, medium; Mendocino, medium; Sonoma, very large; Yolo, poor; Sacramento, poor; Placer, very large, never better; San Joaquin, full; Solano, poor and inferior; Contra Costa, medium to full; Alameda, medium; Santa Clara, medium, with full crop in spots; Santa Cruz, very large at Wrights and full at other points; San Benito, full; San Luis Obispo, poor; Fresno, medium; Kings, poor; Tulare, medium; Kern, poor; Santa Barbara, poor; Ventura, fair in foothills, failure in the valley; Los Angeles, fair; Riverside, medium to poor; San Diego, medium; San Bernardino, fair.

THE FRUIT-CANNING INDUSTRY.

California canned fruit has a world-wide reputation, and the industry is a rapidly growing one. Each succeeding year sees a larger and larger pack, and new markets are constantly opening to our fruit in this form. The canning season of 1898 is not yet closed, but enough is known to warrant the statement that, despite a light crop in many varieties, there will be no shortage in the pack of any class of fruits, while the entire pack for the season will be largely in excess of that of any former year. A very largely increased foreign demand for our canned goods has made itself felt in the past two years, and this, together with a largely augmented home demand, has given a strong impetus to the canning industry of the State. The following figures, compiled by B. N. Rowley, of the "California Fruit-Grower," show the growing importance of the fruit-canning industry:

Pack by Variety, in Cases.

Variety.	1895.	1896.	1897.
Apples	4,501	5,987	7,421
Apricots	361,493	308,015	317,408
Cherries, black	26,694	19,786	32,331
Cherries, white	66,268	45,092	110,170
Currants	1,686	4,152	5,697
Grapes	27,212	29,953	32,206
Nectarines	1,040	2,675	1,369
Pears, Bartlett	242,899	268,637	329,794
Pears	3,460	67,314	11,500
Peaches	599,523	617,425	738,794
Plums	135,663	105,037	122,630
Quinces	2,013	4,069	6,199
Strawberries	6,024	5,745	8,166
Raspberries	3,153	3,605	3,810
Blackberries	8,516	14,920	20,976
Gooseberries	11,725	3,974	4,809
Total table fruits	1,500,890	1,506,385	1,753,280
Pie fruits	43,260	31,430	27,883
Gallon fruits	95,657	64,630	118,403
Jams and jellies	42,591	52,743	43,416
Total fruits	1,682,398	1,655,188	1,942,982
Tomatoes	227,893	378,673	318,553
Peas	32,363	49,326	26,796
Asparagus	27,730	45,948	72,048
Beans and vegetables	1,768	2,110	9,760
Grand total pack	1,972,152	2,131,246	2,370,139

PRICES PAID BY CANNERS.

As the greater part of the fruit pack is contracted for before the season opens, a shortage in any variety, unless it should be a total failure, does not affect the pack. The canners must have the fruit to fill their orders and advance their price to secure it, in consequence the shortage, if any, falls upon the dried-fruit output. The following gives a comparison of the range of prices for the principal varieties of fruit, as paid by the canners in 1897 and 1898:

Variety.	1897.	1898.
Apples, per ton	$10 to $15	$10 to $20
Apricots, per ton	15 to 30	40 to 75
Cherries, black	40 to 50	40 to 50
Cherries, white	60 to 120	40 to 120
Grapes	15 to 20	10 to 20
Pears, Bartlett	20 to 25	20 to 40
Peaches	20 to 40	20 to 75
Plums	15 to 20	10 to 25
Quinces	10 to 15	10 to 15

EXPORTING CANNED FRUIT.

The wider demand for our canned goods gives assurance of better prices, and has had the effect of greatly encouraging our growers this year. In treating of the foreign demand for our canned fruits, a writer in the San Francisco Chronicle, July 17, 1898, says:

"The California canned fruit market is in the most excited condition since the year 1887, and, in some respects, is the most peculiar ever witnessed in the business. One cause is the injury to the fruit crop of the State, but the chief reason has been the fact that stocks of California canned fruit throughout the world have been virtually cleaned up and gone into consumption, for the first time in many years. As an evidence of this condition of affairs it may be said that about February last all classes of California canned fruit arriving in England by sailing vessels from last year's pack advanced an average of one shilling a dozen. Since then the English demand has been increasing, and this branch of the trade during 1898 is certain to be the heaviest ever known.

"While several hundred thousand cases shipped last year arrived during the early months of the present season, the demand has been unprecedentedly heavy. The Drumblair, chartered by Balfour, Guthrie & Co., is now loading canned fruit for Liverpool, and one local concern has already placed 10,000 cases of apricots on board. The Lucipara, chartered by George W. McNear & Co., will commence to-morrow loading canned fruits for London, and will take an enormous quantity.

"Still more remarkable than all this is the fact that, for the first time in the history of the industry, a large shipment of California canned goods has been made to Europe overland. The California Canneries Company of this city, an English incorporation, has made a shipment of a trainload of apricots of about 4,000 cases overland to New York, and thence via the White Star line of steamers to Liverpool. These goods are expected to arrive next week. The cost, after landing at Liverpool, it is said, averages fully two shillings higher than last year's price. This demand for European shipments has resulted in a constant advance in the price of canned fruits. Apricots, which began at about $1 10 a dozen, have gone up to $1 30, and other fruits in proportion. There has also been a marked advance in the price of green fruits. Owing to the English demand, some of the canneries secured large supplies of green apricots some months ago at about $25 a ton, but the market price to-day for the same class of goods is around $60 a ton.

"A fact not generally known is that the requirements of the canning business are only 11 per cent of the green fruit crop of the State. The remainder is sold dried or green. Therefore, despite the shortage, it is expected that the canning pack this year will be an average one.

With the exception of 1893, when a short pack was made, the average annual pack of California fruits since 1890 has been about 1,600,000 cases of two dozen cans each. The amount sent to England has been about 300,000 cases a year. The export business is now on the increase, and lately inquiries have come from Russia, Siam, and other distant lands, and some California packers are about to make shipments to Java.

"Throughout the season the fruit-canners have been in a quandary. Those who sold early and fixed a low price for their goods have been compelled to go out and purchase fruit at a very much higher figure to fill contracts. The producers have been greatly excited over prices to be obtained. Buyers have been running through the country to purchase apricots, and in every way the season has been a peculiar one, as when a canner could sell he was afraid to do so, not knowing what his green fruit was going to cost him.

"The only fruit that is cheaper this season than last is the cherry, which is lower than ever before in the history of California."

THE CURED FRUIT PACK.

The cured fruit pack of the present year will show a heavy shortage, especially of apricots and peaches, both of which have been short, and the larger part consumed by the canners. A large number of young orchards coming into bearing have reduced the shortage to some extent, but it is still enough to be serious. Positive figures as to the pack of the present year are not yet obtainable. Below is the pack of different varieties of cured fruits for the past five years:

Kind.	1893.	1894.	1895.	1896.	1897.
Prunes, lbs.	52,180,000	44,750,000	64,500,000	55,200,000	97,780,000
Peaches, lbs.	16,800,000	30,540,000	24,500,000	16,460,000	27.150,000
Pears, lbs.	2,640,000	6,530,000	5,400,000	9,650,000	6,350,000
Apricots, lbs.	9,500,000	28,750,000	10,650,000	6,740,000	30,125,000
Dried Grapes, lbs.	4,900,000	4,500.000	4,250,000	2,690,000	3,450,000
Apples, lbs.	3,800.000	5,850,000	4,560,000	2,350,000	5,230,000
Figs, lbs.	900,000	1,540,000	2,750,000	2,160,000	3,250,000
Plums, lbs.	1,500,000	2,760,000	4,500,000	2,100,000	3,250,000
Nectarines, lbs.	800,000	1,250,000	1,350,000	625,000	285,000
Totals	93,020,000	126,470,000	122,460,000	97,975,000	176,890,000

The best information that can be had in regard to the pack for 1898, places prunes at 75,000,000 pounds; peaches, 500,000; pears, 5,000,000; apricots, 500,000; apples, 1,000,000; figs, 2,000,000; plums, 2,000,000; nectarines, 7,000.

FRUIT AND VEGETABLE PACK.

The value of the fruit and vegetable pack for the year 1897, as compiled by Fontana & Co., for the "California Fruit-Grower," is given as follows:

Fruit Pack.

	Cases.
Table fruits	1,920,000
Pie fruit	30,000
Jams and jellies	8,000
Total fruits	1,958,000

Vegetable Pack.

	Cases.
Tomatoes	328,000
Asparagus	81,500
Peas	30,000
Beans and other vegetables	8,500
Total vegetables	468,000

The output for the year was distributed as follows:

	Cases.
San Francisco	1,074,000
Santa Clara County	371,000
Alameda County	305,000
Los Angeles County	185,000
Sacramento County	125,000
Sonoma County	65,000
San Bernardino County	50,000
Visalia	40,000
Benicia	35,000
Fresno County	30,000
Napa County	25,000
Northern part of State	148,000
Total pack	2,426,000

The value of the above total pack is estimated at $5,000,000, as follows:

Fruit	$2,087,000
Tin	1,145,000
Labor	727,000
Sugar	357,000
Boxes and labels	291,000
Fuel and incidentals	169,000
Tomatoes	100,000
Asparagus	100,000
Peas	24,000
Total value	$5,000,000

The quantities of material entering into the year's total pack are estimated as follows:

Fruit, pounds	86,000,000
Tomatoes, pounds	21,600,000
Sugar, pounds	7,700,000
Asparagus, pounds	4,900,000
Peas, pounds	2,100,000
Tin, cans	58,224,000

Of thirty-eight canneries contributing to the total output, five of them packed 1,187,000 cases, and one alone of the five packed 367,000 cases—probably the largest pack of the kind in the United States, if not in the world.

THE RAISIN INDUSTRY.

There will be little if any diminution in the volume of the raisin pack this season, and the total output of the State will reach about 4,000 carloads, or in the neighborhood of 80,000,000 pounds. Raisin-growing as a commercial factor started in 1873, for while raisins had been grown in the State from a much earlier period, it was not until that year that they assumed the importance of a commercial product. The growth of the industry was rapid from that date, and starting then with 120,000 pounds, it reached 103,000,000 pounds in 1894. Adverse conditions, low prices and small demand caused a falling off in the output. The product by years from 1892 is given below:

Raisin Product of California.

	Pounds.
1892	57,000,000
1893	85,000,000
1894	103,000,000
1895	91,360,000
1896	68,250,600
1897	45,000,000
Total	449,610,600

As in prunes, the increase in local production has been followed by a decrease in importations, as will be seen from the following figures:

Imports of Foreign Raisins into the United States.

Year.	Pounds.	Value.
1891	37,174,180	$1,962,642 55
1892	18,873,670	927,247 44
1893	23,598,985	1,125,522 60
1894	13,660,498	566,626 90
1895	13,888,095	593,118 64
1896	10,202,086	443,285 00
1897	11,917,756	532,554 00

Fruit Shipments of the State from 1887 to 1897.

Year.	Fresh Fruit.	Cured Fruit.	Raisins.	Canned Fruit.	Prunes.
	Pounds.	Pounds.	Pounds.	Pounds.	Pounds.
1887	50,732,990	16,648,520	15,976,500	56,009,130	1,825,000
1888	53,741,670	19,759,140	16,884,570	39,281,340	2,100,000
1889	50,053,050	33,132,050	39,313,740	37,083,725	15,200,000
1890	74,646,000	64,595,181	41,120,330	80,121,950	16,200,000
1891	98,680,100	65,090,229	44,954,850	49,566,680	27,500,000
1892	111,688,600	58,735,980	57,000,000	77,555,820	22,500,000
1893	159,905,000	93,020,000	85,000,000	55,681,400	52,180,000
1894	179,574,800	126,470,000	103,000,000	120,704,000	44,750,000
1895	132,587,000	122,460,000	91,000,000	42,790,000	64,750,000
1896	115,300,000	97,975,000	68,250,600	91,092,000	55,200,000
1897	144,700,000	176,890,000	45,000,000	146,928,000	95,000,000

NO OVERPRODUCTION PROBABLE.

In relation to the question of overproduction of fruits and a profitable market for our future crops, Col. Philo Hersey, general manager of the Santa Clara County Fruit Exchange, says:

"It is safe to assume that within a few years the largest production of any one season thus far will be doubled. In the year 1897 the product of dried fruits in California and Oregon, exclusive of apples and raisins, was 150,000,000 pounds, of which 100,000,000 pounds were prunes, 25,000,000 pounds apricots, and 25,000,000 pounds peaches and other fruits.

"It is gratifying to state that a market for the entire amount will be found before the consuming season closes; 125,000,000 pounds will be consumed by the United States, and the balance in foreign markets. The export trade has exceeded all precedent, and has relieved the home market to such an extent as to make it possible to dispose of the large majority readily.

"The shortage in the foreign product, and the favor in which our fruits are held in Europe, has wrought greatly to our advantage.

"This advantage we cannot always have in assurance, as a good crop in Europe in the chief product, prunes, is in excess of the European demand. However, our apricots, peaches, and pears will continuously take precedence in Europe, and we may look forward with assurance to a good export demand for these goods.

"The home market for 1897-98 has exceeded all former years, and it is reasonable to believe that with increasing population, improved quality, and extended familiarity with their use, our dried fruits will be consumed in largely increased quantities.

"Enormous as the use of 125,000,000 pounds by our people seems, still each individual has to consume but one ounce in two weeks to cause it all to disappear, and if by custom, chance, or desire for luxury, the demand rises to one ounce per day, we would have to import 1,625,000,000 pounds, or increase our production 1,300 per cent. And this is making no provision for Hawaii or Cuba.

"Surely our people cannot yet be surfeited or made sick by being overfed on California cured fruits. Still, we have some difficulty in profitably disposing of the present production, and look forward with some tremor for a profitable disposition of our prospective increased production. Our main reliance must be on the home market, or among the people of the United States. The chief question is, how can we distribute our product so as to reach the great majority of our people?"

THE ORANGE INDUSTRY.

The California orange season was originally well defined, and extended from the middle of January to the end of May. But by extending its area into new sections of the State, with diverse climatic conditions, and the production of early and late varieties, the season may now be said to extend from October 1st to September 30th. In fact, we regard September as practically closing the season, although the old crop usually lingers along until the new crop arrives. Figures for the present season's citrus shipments of oranges from Southern California up to and including September 30th, are 15,006 carloads, as against 9,854 cars in 1896–97. Of this amount about 1,500 carloads were lemons. The markets opened well before the holidays, and many growers, anxious to take advantage of the good prices, shipped large quantities of immature fruit, which had a depressing effect, and many of the Eastern trade papers warned their customers against it. Later in the season a heavy frost visited many exposed situations, and seriously damaged the fruit. Much of this frosted fruit was also forced upon the market, to the detriment of the growers of good fruit, who found their product accepted with suspicion and at very much reduced prices. Later in the season prices recovered somewhat, and on the whole the grower had little cause for complaint in the returns for his crop the present season.

The largest shipments are made to New York, which offers the best and steadiest market for all fruit products. Its consumption of oranges is double that of Boston or Chicago, the next heaviest consumers. After Chicago comes Philadelphia, then Baltimore, and then St. Louis, with the other cities trailing after almost exactly in the order of their population. The reception of a few extra carloads will demoralize prices fearfully in any other city, but the demand in New York is so heavy and steady that prices in its auction rooms have rarely been depressed below a fairly satisfactory level, no matter how large the supply of the fruit.

It may seem strange to the reader that Chicago and Philadelphia each consume fewer oranges than Boston, a smaller city than either, but the reason is simple, as explained by an expert in the trade of New York. Both Chicago and Philadelphia are unusually partial to bananas, and both enjoy exceptional facilities for getting them, Chicago through New Orleans, the country's great entrepot for that fruit, and Philadelphia direct from the West Indies Islands, whence most bananas eaten in the United States are obtained. When oranges are high, bananas go as well in either Chicago or Philadelphia, but this is not so in New York.

ORANGE CROP CONDITIONS.

The orange shipments for 1897–98 were the heaviest in the history of orange-growing in our State. The crop of the coming season will probably fall far below this, partly owing to cold weather, which occurred at blossoming time and which destroyed many blossoms, and partly to the fact that the orange, like most fruit trees, has its seasons of comparative rest, and a season of extra heavy yield is usually followed by one of lighter yield.

WEALTH OF FRUIT.

The Los Angeles "Times" of September 19, 1898, published an article on the industrial value in the last crop of oranges and lemons of Southern California, by E. F. Howe. The figures compiled by Mr. Howe, being deemed of great importance, are embodied in this report, as follows:

"Some months since occasion was taken to refer to the great revenue derived by Southern California from citrus fruit, under the head 'Six Millions in Sight.' The article in question was held up to ridicule by some of the newspapers of Southern California, and by others it was criticised in a better spirit, but by most, if not all who referred to the article, it was thought to be overdrawn. Inasmuch as the real value of an orange and lemon crop to California has heretofore always been a matter of guesswork, it was believed to be of interest to know the true value of the crop of the past season, as nearly as it could be ascertained.

"Great difficulty has been experienced in getting a basis from which to figure, but it was thought that the daily reports of Eastern auctions, published by the 'The Fruit World,' offered a means of arriving very nearly at the truth. It cannot be that the average selling price of oranges and lemons at auction varies far from the average price of all such fruit sold. In the first column in the accompanying table is given the number of cars quoted at auction sales each month, so far as used as the basis of figures following, while in the second column is the average price realized for auction fruit. In the third column is the exact number of cars shipped by the railroads. This does not include express shipments, and no returns are at hand for fruit used for home consumption.

"The estimates for freights paid is on the basis of all fruit being shipped as far as the Missouri River. This would be unjust, probably, were it not for the large amounts paid for expressage for hauling the fruit from town to town, for packing, and for freight on materials used by packing-houses, all of which would prove an offset for the lower freight rates on the small quantity of fruit used on the Pacific Coast.

"It is believed that of the freight paid by shippers fully 25 per cent is disbursed in California, for labor and other expenses of the railroads, which percentage is added to the value of the fruit on the cars in California, to determine the industrial value of the citrus fruit crop.

"It is realized that much criticism of these figures is possible, by those whose interest it is to find fault, and it is not claimed that they are absolutely correct. They have been compiled with a vast amount of labor, simply as an indication, and not as a portrayal, of the value of the citrus fruit industry.

Table of Fruit Products.

	Cars Listed.	Average Price.	Cars Shipped.	Boxes Shipped.	Value Delivered.
November and December	141	$2 73	1,917	644,412	$1,759,244 76
January	379	2 243	1,586	532,956	1,195,510 31
February	642	2 183	2,055	690,480	1,507,317 84
March	999	2 039	2,569	863,184	1,760,232 18
April	1,074	2 158	2,731	917,616	1,980,215 33
May	728	1 795	1,641	551,376	989,719 92
June	534	1 997	1,405	472,080	943,682 30
Balance of season	603	4 47	*1,063	359,168	882,204 96
Totals	5,100	$2 191	*14,967	5,029,272	$11,018,127 60

	Freight.	Value f. o. b. California.	25 Per Cent of Freight.	Industrial Value.
November and December	$579,960 80	$1,179,283 96	$144,990 20	$1,324,274 16
January	479,660 40	715,849 91	119,915 10	835,765 01
February	621,432 00	885,885 84	155,358 00	1,041,243 84
March	776,865 60	983,366 58	194,216 40	1,177,582 98
April	825,854 40	1,154,360 93	206,463 60	1,364,824 53
May	496,238 40	493,481 52	124,059 60	617,541 12
June	424,872 00	518,810 30	106,218 00	625,028 30
Balance of season	321,451 20	560,753 76	80,365 30	641,119 06
Totals	$4,526,334 80	$6,491,792 80	$6,131,586 20	$7,627,379 00

*About.

NEW ACREAGE.

There have been very heavy plantings of citrus trees in the past five years, and many of these young orchards are now coming into bearing. These will very largely reduce the shortage, but from the best estimates made, after careful inspection of the orchard districts of the State made by shippers and growers, the probable extent of the coming crop is placed at 12,000 cars.

NORTHERN CITRUS BELT.

Some very large plantings of citrus trees have been made in Central and Northern California during the past five years, and now there is hardly a county in the State, outside of those in the extreme north and the mountain counties, that does not produce some citrus fruit. During the past season there have been shipped in carload lots from these sections 316 cars, credited to the following points:

Tulare County	118 cars
Sacramento County	17 cars
Placer County	15 cars
Butte County	156 cars
Kern County	6 cars
Yuba County	3 cars
Contra Costa County	1 car
Total	316 cars

This is but the commencement of shipments from these sections, and as the young orchards come into bearing each year, the shipments will be much increased.

LEMON CROP CONDITIONS.

The lemon crop has been uniformly good, and while fair prices have been received for the fruit, these have not been so good as in former years. In treating on this subject, N. W. Blanchard, the pioneer lemon-grower of Santa Paula, writes:

"On January of last year, as gathered from the reports of the County Assessors and other sources, 231,515 lemon trees over four years old, and 865,398 lemon trees in orchard form under four years old, were planted—a total of 1,197,093 trees—nearly enough trees wisely planted and cared for, to go far toward supplying the present market of the world with lemons. This remark may seem extravagant, but the facts justify the statement. This country consumes about 3,000,000 boxes of lemons. A small average of 2½ boxes per tree gives 2,992,745 boxes of lemons—enough to supply this country; 1,196,096 trees, and at five boxes per tree, would produce 5,995,490 boxes—practically double the amount consumed in this country, and equal the entire export of Sicily for the year 1896. My old lemon trees have been giving me as much as five boxes per tree. I prophesy, however, that there will not be any increase of acreage of lemon orchards. Already many have commenced to bud their lemon trees into oranges, and others will do so or abandon the lemon culture."

CITRUS SHIPMENTS.

The shipments of citrus fruits from California for the past eight years, in pounds, are as follows:

Year.	Pounds.
1890	68,084,000
1891	93,842,000
1892	69.714,000
1893	161,514,000
1894	117,928,000
1895	231,650,000
1896	198,312,000
1897	197,094,000

CITRUS PRODUCT TOTAL.

The following tables give the values of citrus fruit importations into the United States for the past seven years:

Year.	Oranges.	Lemons.	Limes.
	Value.	Value.	Value.
1891	$2,330,127 71	$4,345,979 08	$59.867 35
1892	1,210,080 90	4,560.261 16	37,829 45
1893	1,696,277 24	4,993,829 87	47,196 36
1894	1,111,059 15	4,284,815 92	48,763 50
1895	1,997,515 31	3,917,106 75	25,103 63
1896	2,694,155 50	5,027,732 95	39,601 69
1897	3,341,646 64	4,025,354 49	28,700 29

Year.	Lemon and Orange Oil.		Lemon and Sour Orange Juice.	Orange and Lemon Peel.
	lbs.	Value.	Value.	Value.
1891	179,412.33	$270,255 39	$140,672 80	$5,222 14
1892	215,794.88	402.907 00	156,832 75	5,185 78
1893	222,850.72	383,226 22	195,203 59	7,742 45
1894	212,876.00	240,487 00	71,021 00	11,734 00
1895	238,281.00	216,043 00	61,884 00	20,579 02
1896	206,656.13	214,302 00	84,073 25	15,853 00
1897	304,270.90	270,023 82	74,848 00	28,466 00

OLIVES AND OLIVE OIL.

The olive crop of 1898 is a very short one; in fact, there are so few orchards that will give any returns that it may be termed a failure. This was caused principally by unfavorable weather conditions at blossoming time, which caused the blossoms to drop and prevented the fruit from forming. The olive has grown very rapidly in favor as an orchard tree in the past five years, and the olive acreage in this State is being rapidly extended year by year. At the same time there is a growing demand for pure olive oil and ripe pickled olives, but even yet the popular taste has got to be educated in the use of these articles. The great drawback to the olive oil industry lies in the fact that the market is glutted with spurious oils, which are sold at prices with which the pure articles cannot compete. If we could have a national pure food law, under which these fraudulent decoctions would have to appear under their true name, the demand for pure oil would increase, and our growers would be able to fill it profitably. As showing the consumption of olives and olive oil in the United States, the following figures give the importations for the past seven years:

Date.	Olive Oil—In casks.		Olive Oil—In bottles.		Olives. Value.
	Gallons.	Value.	Gallons.	Value.	
1891	709,496.19	$458,079 55	395,731.42	$516,190 89	$320,163 77
1892	600,379.00	255,867 00	685,079.98	852,655 11	417,881 55
1893	986,379.00	481,171 00	693,759.51	902,076 45	510,534 88
1894	391,691.00	180,212 00	744,438.91	900,013 10	378,863 41
1895	829,889.00	336,909 00	777,047.54	953,832 65	325,352 10
1896	525,630.00	220,903 00	918,629.40	1,093,460 39	347,344 70
1897			945,828.00	1,146,494 52	328,436 84

OTHER IMPORTS.

For the past seven years we have imported into the United States fruit and fruit products as follows:

Date.	Zante Currants.		Figs.		Grapes.	
	Pounds.	Value.	Pounds.	Value.	Barrels.	Value.
1891	42,849,814	$1,577,852 15	9,063,663	$672,141 00		$534,820 80
1892	36,665,728	1,209,095 75	8,324,861	510,591 03	228,934.00	478,118 50
1893	33,166,364	1,185,532 00	10,060,092	549,488 22	158,869.57	485,763 50
1894	52,350,053	773,952 00	7,930,316	372,613 50	222,468.32	816,602 00
1895	15,936,019	250,658 00	11,559,092	574,393 45	149,791.91	335,110 00
1896	32,351,985	540,694 25	11,635,493	629,488 00	205,524.75	490,788 09
1897	28,218,176	572,803 00	8,837,572	532,974 50	170,864.51	374,440 03

Date.	Almonds.		Almonds—Shelled.		Sweet Almond Oil.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
1891	3,390,924.50	$292,510 85	3,046,750	$615,418 97	51,384.0	$12,248 95
1892	2,451,840.50	290,744 20	3,598,551	667,179 46	60,670.5	13,636 35
1893	2,780,011.00	270,742 00	3,758,500	664,562 27	212,919.0	39,583 50
1894	3,305,360.00	259,139 69	3,505,178	519,584 34	59,730.0	12,682 45
1895	4,178,419.00	281,296 21	4,188,831	561,064 67	74,195.0	13,103 80
1896	3,202,684.16	210,690 15	4,245,426	572,105 70	71,480.0	13,791 00
1897	4,196,609.00	244,408 07	5,798,354	683,446 34	86,594.0	19,059 59

Date.	Bitter Almond Oil.		Filberts and Walnuts.	
	Pounds.	Value.	Pounds.	Value.
1891	4,795.00	$9,958 00	15,119,507.0	$872,043 84
1892	6,149.00	11,023 00	12,392,096.0	647,628 55
1893	8,165.80	11,532 89	11,900,846.0	673,705 00
1894	4,104.00	6,981 00	10,122,079.5	450,834 99
1895	6,549.00	10,566 00	11,670,895.0	530,922 13
1896	6,195.75	12,141 83	16,226,147.0	638,060 46
1897	10,471.90	12,029 00	12,827,174.5	632,858 99

NEW FRUIT CREATIONS.

A large number of specimens of new fruits, originated by cross pollination, but the most through Dame Nature—by chance—have been submitted to us for examination as to their worth for propagation. The greater portion possess some merit, but are lacking in distinctive features to entitle them to be placed in the list of "worthy" kinds. The following is a partial list of the new prune and plum creations which bid fair to eventually supersede their parent or mother types:

PRUNES.

Sugar Prune.—An extremely early prune, ripens August 1st, cures superbly rich, with a yellow flesh, tender, and rich in sugar juice. Skin very tender, at first of a light purple, tinted with green, changing at maturity to dark purple, covered with a thick white bloom. Form ovoid, slightly flattened, measuring 5 by 6½ inches in circumference. Average size 15 to the pound, which is two or three times larger than the Petite, or ordinary French prune, so called. Fruit stalk short, severs very easily from the stem as the fruit reaches maturity. Pit medium size, flattened, slightly wrinkled, and most often separated from the flesh. The skin is so thin or porous that the fruit begins to shrink on the trees fully as soon as ripe. Tree an unusually vigorous grower and *very productive.* One pound of fresh fruit makes 7½ ounces when rattling dry. By the usual mode of curing one pound of fresh fruit would probably make one half pound when cured. Analysis of the fresh fruit at the State University disclosed the fact that it is *nearly one fourth sugar*, the exact amount being 23.92 per cent; the average of sugar of the Petite prune being 18.53 per cent, and of all prunes 15.33. A seedling of Petite, and bids fair to revolutionize the the prune industry of the world, originated by Luther Burbank, of Santa Rosa,

Highland.—A seedling of Petite. A large, handsome prune; skin deep purplish crimson. Flesh dark yellow, very sweet, quite firm, excellent flavor; ripens August 10th, about ten days before the Petite or French prune. Pit medium size, freestone or nearly so. Tree vigorous and productive. Fruit averages about twice the size of the French prune. Originated by Luther Burbank, of Santa Rosa.

Splendor.—Raised from seed of the French prune, crossed with Pond's Seedling. Fruit averages about twice as large as the Petite or French prune; trees even more productive, bearing the fruit low down on the branches, thus avoiding breakage. Fruit a handsome flattened ovoid, dark purple, with a heavy blue bloom. Flesh yellow, rich, and sweet, though not so firm as Petite prune. The only objection to this prune is that it clings to the tree instead of falling when ripe, like the Petite or French prune; also, it ripens altogether. This would be a serious objection if planted largely, as it would be difficult to handle the fruit all at once. Originated in 1886 by Luther Burbank, of Santa Rosa.

Giant.—Parentage same as Splendor. One of the largest of all known plums or prunes, well-grown fruits averaging nearly or quite three inches long by two inches in shortest diameter. Skin light crimson, with numerous yellow dots, flesh yellowish, rather firm, rich, sweet, delicious to eat fresh. Pit medium or small for so large a prune, flat, nearly smooth. Freestone when fully ripe. Not recommended for drying, as it is too large and shrinks heavily. Tree a very strong grower and constant bearer. Specially valuable for shipping and for growing in the warmer parts of the State. Originated by Luther Burbank, of Santa Rosa.

Imperial Epineuse.—This is one of the largest plums known in this State of the so-called "prune" type. It was imported into the State from France by Mr. Felix Gillet, of Nevada City, in 1883, and by Mr. John Rock, of Niles, in 1885. It is a handsome, showy prune; grows to an extraordinary size, under favorable conditions weighing when fresh as high as eight to the pound. Fruit large, ovoid, with the cheeks convex, sprinkled with large and well-defined white specks, borne well into the large or main limbs, the foliage protecting it from sunburn. Skin thin, tender and firm, light reddish purple at first, tinged with green, at maturity becomes quite dark, with a reddish cast, covered with a thin white bloom. Pit medium large, flattened, quite wrinkled and grooved, with denticulated edges and sharp toward the end. Flesh dark yellow, fine, tender, but not rich in sugar juice. Tree vigorous, branches strong, grow upright, deep brown, splashed with green and ashy gray, smooth, with large thorny-like spurs. Leaves large, oval-elliptic, slightly wavy in their outline, bordered with teeth deeply cut, rounded or deeply crenated, well supported on strong petioles. Fruit buds large, ovoid, quite sharp, short, and gathered on rather thick. Flowers large, with large rounded petals. General hue of the foliage a deep, dark green; stiffness of all the leaves and strong upright growth of the shoots are the striking characteristics of the tree.

In the past two years many experiments have been made to determine the bearing and drying qualities of this prune. Many at first reported having met with great success in drying it, especially in portions of the San Joaquin and Santa Clara valleys. This was, however, with a limited amount of fruit, in many cases only a few pounds, which in manipulating gave different results from larger amounts as conducted this year. For two years it has been exhibited at the State Fair in the cured state. Of these I obtained several boxes and put them away to determine its keeping qualities. The ones packed in fifty-pound boxes molded very soon after being stored away, owing to having been poorly cured. Those packed in five-pound boxes were all extra large-size fruit, especially selected and well cured. These kept for nearly a year without showing the least trace of sugaring. The experience of many growers in drying this prune is variable; while it has its advocates, especially for its large size and beauty, others doubt whether it can be profitably cured on a large scale.

Mr. S. F. Leib, of San José, one of the largest prune-growers of the State, under date of October 20, 1898, says: "Your favor of 19th inst., with reference to Imperial Epineuse prune, is at hand. The tree is a good stocky grower; its bearing qualities not yet demonstrated to be very good; am afraid it is shy every other year; is a first-class fruit when the same is successfully cured. It is a very hard fruit to dry; we are almost at our wits' end to know how to accomplish that result. It molds very easily, and we have about concluded that one of two things will have to be done, either dry it in an evaporator, which of course is very costly, or else stack the prunes every night from the time they are put out until finished, which is almost as much so. The prunes are very large, and hence it takes several weeks to cure them. By the time all extra expenses are paid it is a serious question whether it does not eat up all the extra price that is received on this prune over the French prune, especially when it shall have become more common and the price will be more at a par with the smaller prunes. I might add in reference to this prune that we have found considerable trouble in softening such large fruit sufficiently for the "facers" in packing the prunes; still, when all has been said, when the prune is cured properly, I think it has a flavor unequaled and which is all its own. Mr. Luther Burbank, whose place at Santa Rosa I have visited this summer several times, has a new prune—the "Sugar prune"—which I think will supplant it and all other varieties. It is, I think, as large as the Imperial and has one third more sugar than it or the French prune, and ripens in the latter end of July, so that its drying is easily accomplished. Were I to extend my operations further in the dried fruit line I would certainly demonstrate whether it was a success in my locality and on my soil, and if so would confine myself to it exclusively hereafter. I understand it has not yet been put upon the market, but I take this occasion to call the attention of fruit-growers to it, as it surpasses anything in that line I have ever seen."

Mr. T. J. True, of Forestville, Sonoma County, under date of October 31, 1898, says: "My Imperial Epineuse prunes dried a trifle heavier than 3 to 1; 157 pounds of fresh fruit dried 54 pounds. My Petite prunes dried a trifle heavier than the Imperial, the shrinkage of Petite being 2.76. This prune is a trifle more difficult to dry than the Petite, but not enough to make any material difference. The average size was 41 cured prunes to the pound; of Petite, 85 to the pound on the same soil."

Mr. I. H. Thomas, of Visalia, under date of November 14, 1898, says: "I have consulted with Beal and Jacobs, and the consensus of opinion is that the prune is worthy of introduction. The quality not being quite up to the Robe de Sargent and Petite, but the size will recommend it favorably."

Mr. John Markley, of Geyserville, Sonoma County, under date of November 24, 1898, writes as follows: "I purchased the trees I have from Mr. Gillet, of Nevada City, Cal., under the name of Clairac Mammoth. I am inclined to think they are about the same. The Clairac Mammoth grows very large, if thinned. At my place in Sonoma County they get ripe about August 10th for the first ones, on warm, early soil with gravel in it. If well thinned I have grown them so that 15 ripe prunes will weigh two pounds. They are thin-skinned, very easy to cut with lye. The lye that will cut French prunes will skin Clairac Mammoth; inclined to dry dark to black around pit. If on good land, fully ripe and carefully handled make fine, large, black dried fruit. but are easily sunburnt; very liable to dry dark at pit. Many make only second-class fruit. I do not condemn them, but cannot recommend until I have had more experience with them. I have about 700 trees, and am not planting any more for the present."

The following are extracts from a letter from Mr. Felix Gillet, under date of November 16, 1898: "The Imperial Epineuse prune was a chance seedling originated over twenty years ago in the great prune district of France, having been found in an old abandoned monastery near Clairac, in the Valley of the Lot; hence its new name of 'Clairac Mammoth,' adopted at the time I put it on the market, season of 1893-94. The Imperial Epineuse, on account of its size, was duly and properly tested at the time of its introduction in France, somewhat before 1880, but it was found so hard to cure in driers—and all the prunes in France are dried in that manner—because of its great juice, that it made the French finally give it up, after having given it a fair trial. And the assertion that it is from this variety the dried fruit coming to this country in fancy packages labeled 'Imperials' is made is untrue. The Imperials imported to this country in glass jars and fancy packages are Imperials only by name, being prunes of 65 to 70 to the pound; the larger grades, 40 to 50 and even 50 to 60, are never imported to this country, but are all exported to the capitals of Europe, in which places they find people willing to pay the *fancy* prices asked for them. The French never perpetrated such a trick on the public as packing for 'Prune D'Ente' prunes that were of another kind, such as Imperiale de Paymirol, Imperial Epineuse, Robe Imperiale, and the like. Before going any further into the subject, I must say that since 1870 I imported more or less trees from France and inquired all around for new varieties of fruit and nuts, or first-class varieties of both, that I might never have heard of before; in this way, as I was importing prune stock for market of the Robe de Sargent from the Lot or Agen district, what we call here French prune, and which cured is exported by Bordeaux houses under the name of Prune D'Ente, I was advised to try the Imperial Epineuse and see if it would not do better here than there; so in the winter of 1893-94 I imported fifteen trees, procured from the originator or propagator of that prune. I found the stock mixed with the French prune, which could easily be told, and the ensuing season I ordered fifty more trees, badly mixed, too, but I had enough *true* trees to get along with, if the 'gum' so prevalent up here had not killed the trees one after another. I wanted to have fruit in quantity large enough to give that prune a fair trial before putting it on the market. I first mentioned this prune in my catalogue of 1888–89, and though not giving out its old or newly adopted name, I think that I then said a little too much about that new prune, thus awakening people's interest and curiosity about it, but I expected surely at that time to put it on the market in a year or two, but which I was prevented from doing because of scarcity of trees, depending on parties in France to procure me the stock I wanted, say 10,000 to 15,000 little trees, which they grafted for me in the spring, but which they were unfortunate enough to lose, one year by a freshet that washed away all the stock, and another year a big drought dried up everything. Finally, I did put the prune on the market under its newly adopted name, suggested by me, of 'Clairac Mammoth,' in 1893–94. During that long period, however, I had enough fruit to experiment upon, and found out, the same as they did in France, that it was a hard prune to cure, on account of its juice, but that if cured properly it made a delicious prune. The pulp of the prunes dried by me in *drier* was of a golden hue, and I never had any Clairac Mammoth prunes black in the center all around the stone, as is the universal complaint about the prune distributed throughout the State under the name of 'Imperial Epineuse.' The Imperial Epineuse is so called because of its large size, being as large as an Imperial prune, and Epineuse because of the numerous thorns (*epine*, in French) found on the body of the tree in nursery row; these thorns or spines on trees turning into *fruit spurs* when ready to bear."

Mr. John Rock, President of the California Nursery Company, under date of December 24, 1898, from Niles, writes: "In October, 1885, I requested my agents, Messrs. Levavasseur & Fils, Ussy (Calvadoc), France, to procure for me, from the prune-growing districts, a lot of scions of all prunes cultivated for drying. They came March 17, 1886, and were grafted on old orchard trees. The varieties are Imperial Epineuse, Imperial Puymirole, Vrai d'Agen and du Roi. They fruited the year following, and are still growing and fruiting at my place at San José. Messrs. Levavasseur & Fils received the scions from the Departments Lot and Garonne, France.

"The past dry season the Imperial Epineuse trees were not so much affected by the drought as the French prune trees growing side by side, and retained their foliage until frost.

"I have fruited the Imperial Epineuse the past ten years. Trees had a good crop every year, for their age and size. Some seasons the crop was heavier than in other years. This past season the crop had to be thinned to keep the trees from breaking down. Good care is required in handling this prune when ripe, owing to their thin and tender skin. When dried, an average crop will run 20 to 60 to the pound; three fourths will be 20 to 40 to the pound."

Analyses of samples of this prune were made at the Agricultural Experiment Station at Berkeley last year and this season, as follows:

Analyses of Imperial Epineuse Prunes.

Date of receipt and analysis	Aug. 23, 1897	Sept. 15, 1898
Place of production	San José	San José
Sender, or grower	S. F. Leib	John Rock
Physical Analysis.		
Average weight, in grams *	50.0	46.0
Number, per pound	9.05	9.8
Flesh, per cent	97.0	95.6
Pits, per cent	3.0	4.4
Sugar.		
In whole fresh fruit, per cent	10.0	20.4

*About 30 grams are equivalent to one ounce.

(Signed): GEO. E. COLBY.

PLUMS.

October Purple.—Cross of Satsuma and a seedling Japan plum. Unusually vigorous tree, with very strong, hard wood. No plum could produce more fruit or more constantly. Fruit very large, oval, deep purple, with a slight bluish-white bloom. Flesh dark yellow, rich, sweet, juicy, resembling Imperial Gage, but of much better quality, clingstone, ripening from September 15th to October. Originated in 1892 by Luther Burbank, of Santa Rosa.

Climax.—Cross between Simoni and Botan, very large, measuring 6¾ by 7½ inches in circumference. Heart-shaped, a superbly rich plum, extremely early, ripens in the coast counties early in July, before any other good plum. Color of flesh yellow, sweet and delicious, very aromatic, with a pineapple fragrance. Skin thick, firm, deep vermilion red, with very minute white specks; stem short, strong; pit medium to large. Separates easily from flesh. Tree a vigorous grower, very productive. Branches and leaves resemble the Heart cherries in size and vigor. This is destined to become the best shipping plum that has come to my notice. Originated by Luther Burbank, of Santa Rosa.

CLIMAX.

Juicy.—Hybrid of Robinson (American) and Botan (Japanese). Tree much more vigorous than the American plums. Fruit quite large, oval, glossy yellow, half transparent, productive and good. Pit rather large, thick. Too soft for shipping. Originated by Luther Burbank, of Santa Rosa.

Bartlett.—A hybrid between Prunus Simoni and Delaware. Fruit oval-conical, medium size, light yellowish crimson, with a smooth, polished, glistening skin. All the branches grow up perfectly straight, forming a dense upright handsome head. Leaves large and glossy, as if varnished. Produces fruit abundantly the second season, of the size of a large Imperial Gage and when fresh from the tree of most delicious flavor, clingstone, pit medium to large, very far exceeding the Bartlett pear at its very best in its rich, delicious, indescribable pineapple flavor and fragrance, being like the Bartlett in flavor, but even more delicious. Productive, but too soft for distant shipping. Originated by Luther Burbank, of Santa Rosa.

BARTLETT.

Shiro.—From Myrobolan, Wickson, and Robinson, a tri-specific hybrid. Fruit egg-shaped, medium size, suture indistinct; smooth, bright yellow, transparent, bloom thin white; cling; quality good. Remarkable for its great productiveness, rivaling the Burbank in this respect. Strong grower, having the appearance of a gigantic Myrobolan plum in leaf, fruit, and growth. Originated by Luther Burbank, of Santa Rosa.

SHIRO.

Gold.—Parentage same as Juicy; very large, almost perfectly globular. Golden yellow, overspread with a faint carmine haze, exceedingly small pit, cling; golden yellow flesh, quite firm; a good shipper, and has been shipped from California this season under the name "Late Klondike." Tree a slender grower, with wiry branches, exceedingly productive; ripens late, last of September. Originated by Luther Burbank, of Santa Rosa.

Wickson.—A superbly rich, early plum, abundant, and a constant bearer. Has proved hardy in the cold Northern States and Canada. Tree a good strong, upright grower, of vase-like form; wood light olive color, inclining to green. Leaves long, narrow, light green. Fruit large, heart-shaped, symmetrical, under favorable conditions grows as large as turkey eggs. Skin orange yellow, dashed and striped with crimson, with a thin white bloom. Flesh light yellowish salmon, fragrant, tender, juicy, sweet and delicious, with a slight almond flavor. Pit small to medium, long in form, much like some of the Domastica plums. Originated by Luther Burbank, of Santa Rosa, fruited first in 1893 on his experimental farm at Sebastopol, and was introduced by him in the spring of 1895. While this plum is not a recent creation, it is given a place in this report on account of its superior quality and to correct its nomenclature. In the season of 1897 shipments of this plum were made to New York under the false name of "Eureka." Handsome prices were realized for the fruit, causing growers to plant the variety largely, only to find it to be a duplication. In justice to the orginator and the growers in general this practice of shipping fruit under a false name should be discontinued.

POLLINATION OF FRUITS.

With the object of ascertaining whether cross-pollination of fruits could be accomplished successfully, a circular letter was sent out last spring, asking growers to assist us in making experiments and taking observations as to the time of blooming of the different varieties. Many growers throughout the State responded promptly, but we were unable to make extensive experiments, owing to a series of unfavorable meteorological phenomena, especially very low temperature during the blossoming season. However, we were able to determine the difference in time of blooming of some of the most important sorts, and conduct several experiments. These results are embodied in the report herewith, not as conclusions, but to aid experimenters in the work this coming spring.

For several years many have been led to the belief that by planting trees of certain varieties, which are profuse bloomers, alongside of scant blooming sorts, the pollen would so intermix as to insure a crop. Many have reported having had a full crop almost every year wherever this has been done. But again at times failures are reported from those orchards, placing the whole subject in doubt.

It was for the purpose of ascertaining the merits of such practice that the investigation was made, and which will be continued this season. The following is a summary of the observations taken:

	First Bloom.	Full Bloom.	Blossoms Fell.
Rohnerville, Humboldt County:			
Petite Prune	Mar. 18	Mar. 28	Apr. 3
Robe de Sargent		Mar. 15	Apr. 1
Silver	Mar. 22	Apr. 12	Apr. 23
San Jose:			
Petite	Mar. 12		Mar. 30
Robe de Sargent	Mar. 15		Apr. 5
Silver	Mar. 27		Apr. 15
San Mateo:			
Petite	Mar. 8	Mar. 24	Apr. 1
Robe de Sargent	Mar. 10	Mar. 20	Mar. 27
Tragedy	Mar. 5	Mar. 10	Mar. 20
Napa:			
Petite	Mar. 23	Mar. 31	
Robe de Sargent	Mar. 19	Mar. 28	
Tragedy	Mar. 10	Mar. 23	
Watsonville:			
Petite	Mar. 10	Mar. 22	
Robe de Sargent	Mar. 14	Mar. 28	
Tragedy	Mar. 5	Mar. 15	
Julian, San Diego County:			
Petite	Apr. 2	Apr. 10	
Silver	Apr. 10		
Ione, Amador County:			
Petite	Mar. 15	Mar. 26	Apr. 12
Robe de Sargent	Mar. 15	Mar. 24	Apr. 10
Silver	Mar. 22	Apr. 3	Apr. 20
Tragedy		Apr. 13	Apr. 30
Lodi, San Joaquin County:			
Petite	Mar. 15	Mar. 31	Apr. 15
Tragedy	Mar. 8	Mar. 24	Apr. 8

The above observations, although not extensive, show the difference of time of blooming to be very slight. We covered about 150 trees in different localities with thin cloth before the buds opened, intending to determine the sterility of the species, but to our regret the greater portion of the bloom froze, thereby preventing a determination of the matter the past season.

Tests of artificial pollination were made on sixty-one trees, differently situated, but while the fruit was small, a heavy wind diminished the crop, and thereby again interfered with arriving at any practical results.

While this paper does not contain conclusions of value, it is presented with a view of having the growers study the question from a practical standpoint, to determine, if possible, the varieties that are profuse bloomers, and that will bloom together and distribute their fertile pollen naturally among the blossoms of non-pollen bearing sorts, or whether it will pay to pollinate artificially to insure a crop.

TOTAL FRUIT TREE ACREAGE.

The following are the number of trees and acreage in fruit in the State in 1897, compiled from Assessors' reports to the State Board of Equalization:

Kinds.	Bearing Trees.	Non-bearing Trees.	Total Trees.	Total Acres.
Apple*	1,029,582	547,214	1,576,796	22,852.1
Almond*	1,001,009	602,476	1,603,485	23,238.9
Apricot*	1,628,834	1,116,076	2,744,910	39,781.3
Cherry*	394,836	179,794	574,630	8,327.9
Fig**	135,007	81,059	216,066	4,501.4
Olive**	364,811	1,797,909	2,162,740	45,057.0
Peach*	3,285,597	2,236,370	5,521,967	80,028.5
Pear*	987,921	532,035	1,519,956	22,028.5
Prune—French*	4,500,313	2,721,659	7,221,972	104,666.3
Prune—Other kinds*	507,986	342,885	850,871	12,331.4
Lemon*	263,240	642,502	905,742	13,126.7
Lime†	250	100	350	3.2
Orange*	1,683,885	1,968,569	3,652,454	52,934.1
Walnut‡	255,843	279,918	535,761	19,843.0
Plum*	7,632	4,406	12,038	174.4
Nectarine*	15,625	257	15,882	230.2
Quince†	4,988	692	5,680	52.6
Pomelo** (grape fruit)§	2,233	22,227	24,460	509.6
Miscellaneous†	123,284	133,243	256,527	2,565.3
Totals	16,192,876	13,209,411	29,402,287	452,252.2

Grapes—Wine, raisin, and table (compiled by the California Wine Growers' Corporation), 157,000 acres.

§ Pomelo plantings have been very heavy. There were over 6,000 acres set out in the past three years.

Averaged—* 25 feet apart. ** 30 feet apart. † 20 feet apart. ‡ 40 feet apart.

Assessors' returns are considered too low to be strictly accurate, 20 per cent additional being conceded nearer correct. With this addition the total acreage is as follows: Bearing trees, 19,431,451; non-bearing trees, 15,851,293; total trees, 35,282,744; total acres, 542,702.6.

ORCHARD PESTS.

Orchard pests have been the leading topic of discussion in this State for a number of years, and while the ones that became established have been kept in subjection by both artificial remedies and their natural enemies, it should be said that this State is to-day freer from the ravages of fruit and tree pests than any other State or country. The pernicious scale, or "San José" (so called), which at the present time is agitating the minds of horticulturists of the Eastern States and of other countries, has been almost entirely annihilated by internal parasites. It is rarely that an orchard is now reported seriously affected by it. The cottony cushion scale has been practically exterminated by the Australian lady-

INSECT PESTS LIABLE TO BE INTRODUCED INTO THE STATE. PLATE X.

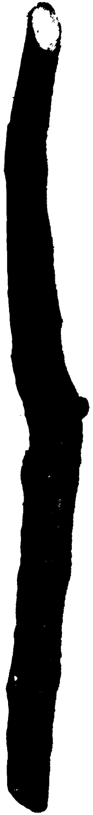


Fig. 1.

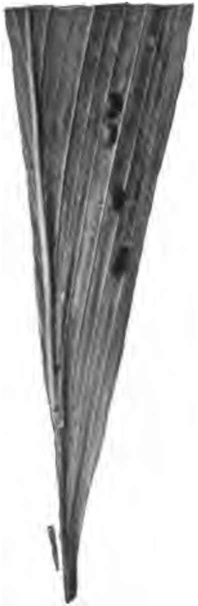


Fig. 2.

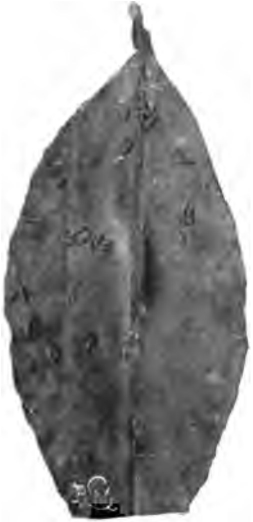


Fig. 3.

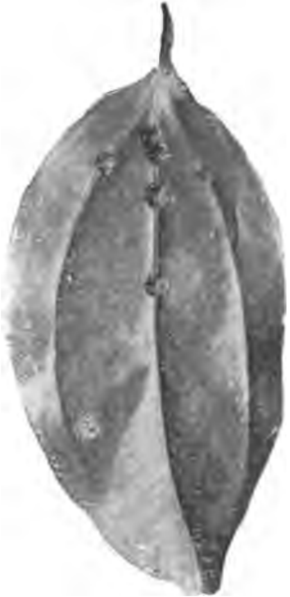


Fig. 4.

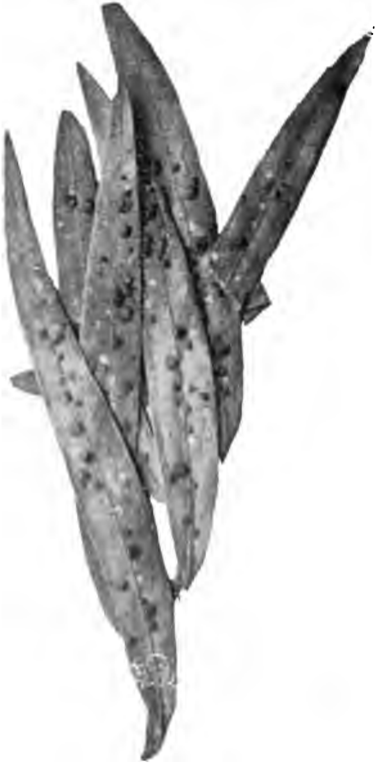


Fig. 5.

Fig. 1—Mining scale (Chionaspis Howardia), Tahiti. Fig. 2—Lecanium perforatum, Hawaiian Islands. Fig. 3—Mytilaspis citricola, Panama. Fig. 4—Ceroplastes rubens, India. Fig. 5—Aspidiotus rossii, Australia.

INJURIOUS INSECT PESTS LIABLE TO BE INTRODUCED INTO THE STATE.

PLATE XI.

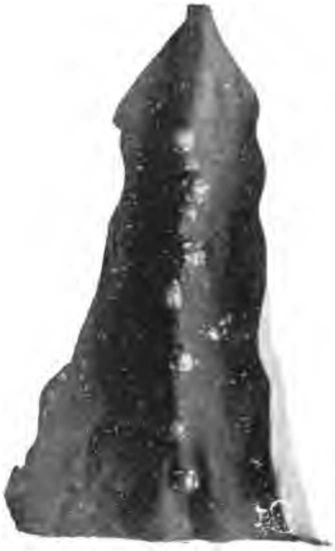


Fig. 1.

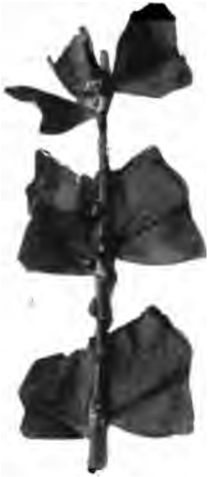


Fig. 2.

Fig. 3.

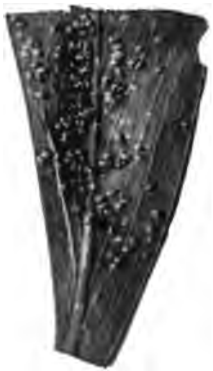


Fig. 4.

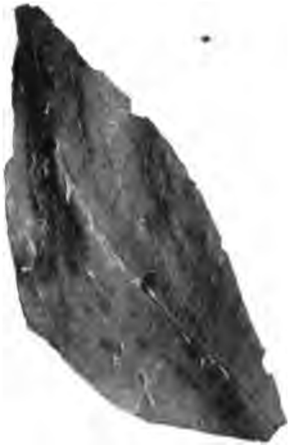


Fig. 5.

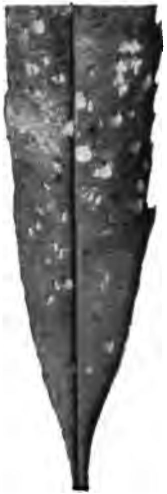


Fig. 6.

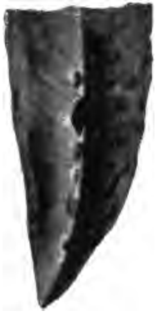


Fig. 7.

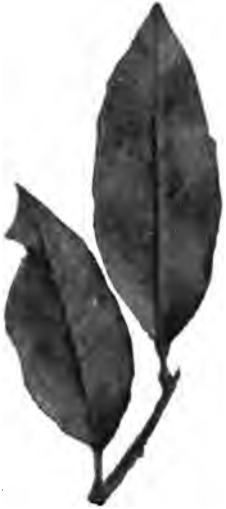


Fig. 8.

Fig. 1—Ceroplastes rubens, Honolulu. Fig. 2- Lecanium nigrum, Hawaiian Islands. Fig. 3—Ceroplastes ceriferus, Japan. Fig. 4—Chionaspis assimilis, Australia. Fig. 5—Mytilaspis carinata, Acapulco. Fig. 6—Chionaspis chinensis, China. Fig. 7—Lecanium longulum, Hawaiian Islands. Fig. 8—Mytilaspis crawii, Japan.

THE EASTERN QUINCE CURCULIO. PLATE XII.

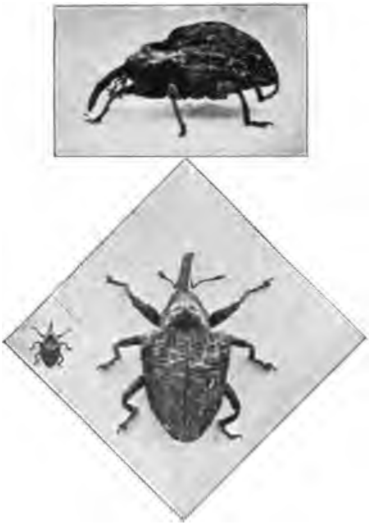


Fig. 1.
THE QUINCE CURCULIO, NATURAL SIZE AND ENLARGED.

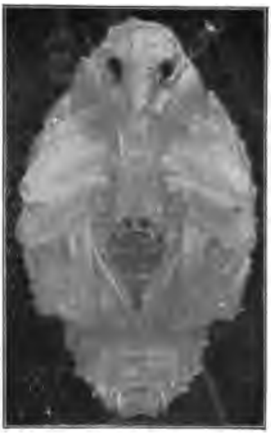


Fig. 2.
THE PUPA OF THE QUINCE CURCULIO ENLARGED.

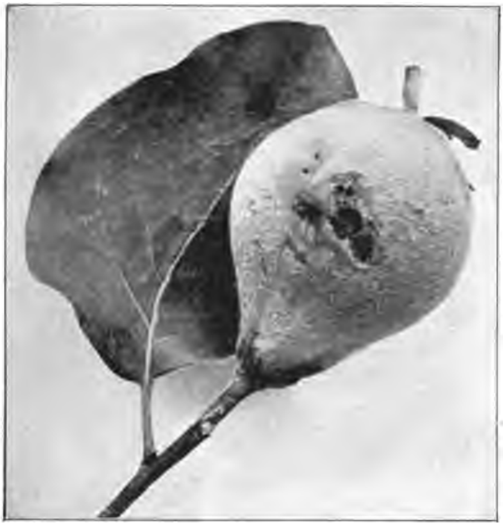


Fig. 3.
YOUNG QUINCE SHOWING THE MANNER OF BREEDING OF THE CURCULIOS.

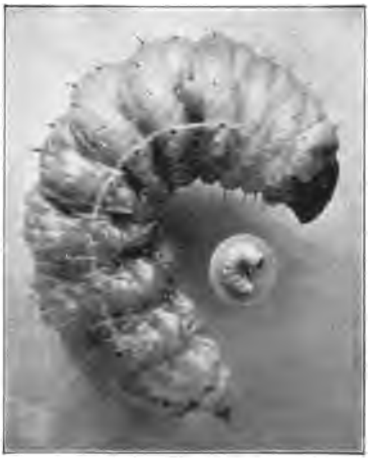
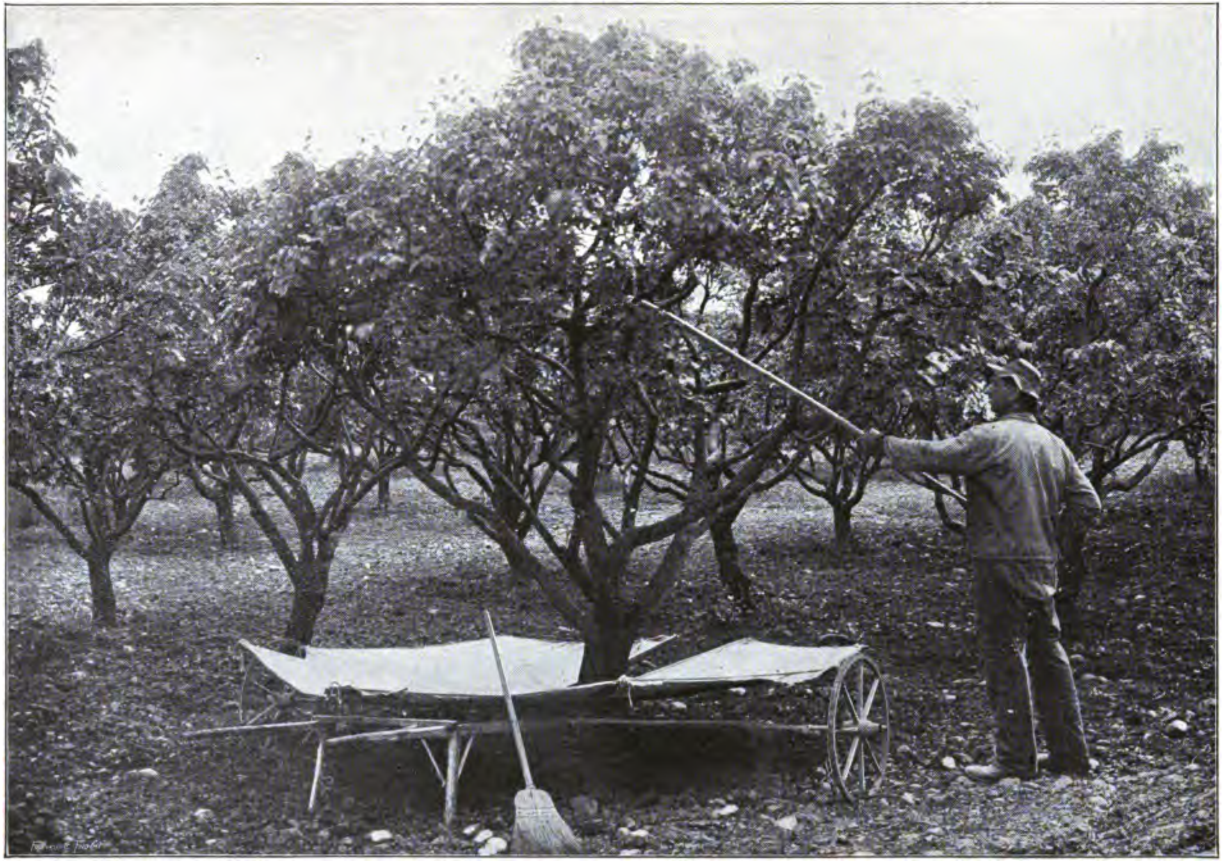


Fig. 4.
GRUB OF THE QUINCE CURCULIO, ENLARGED AND NATURAL SIZE.

From Bulletin 148, Cornell University Experiment Station, after Slingerland.



JARRING FOR THE QUINCE CURCULIO WITH A LOW "CURCULIO CATCHER," IN ORDER TO SAVE THE CROP.
From Bulletin No. 148, Cornell University Experiment Station, Ithaca, N. Y.

bugs, *Vedalia cardinalis* and *novius koebelei*, introduced through the agency of the State Board of Horticulture. The black scale is also meeting the same fate by the black Australian ladybug, *Rhizobius ventralis*, which has increased almost everywhere with astonishing results. Many orchardists, especially along the coast and bay counties, have abandoned artificial means for destroying the black scale, and leave it all to nature's work. The mealy bug, which is so troublesome, especially among greenhouse plants, is readily exterminated by the ladybug *Cryptolæmus montrouzieri*.

The original consignments of all these insects numbered in each case less than twenty beetles. It is difficult to now estimate the many millions that have been distributed in the orchards throughout the State—the product of those apparently insignificant insects. But this would only tend to teach, not only the skeptic but also the scientist, their wonderful powers of reproduction, and it is to be hoped that in time a parasite—nature's remedy—will be found for all known pests abounding in our orchards.

The marvelous success that has been attained by the importation of beneficial insects that prey upon the enemies of our fruit products has more than met our most sanguine expectations. We have realized results, established by the most convincing proofs, that the parasites now at work will keep in check nearly if not all the scale insects that exist in California. The State has been saved millions of money by their importation. It is to be hoped that the investigation will be continued until every insect enemy of the products of the soil will have its parasite discovered and colonized, that the cultivator may be protected from any material injury by insect pests. We consider this discovery the most important that has taken place in this century. The development of this principle has to do with every product of the soil. It secures to the cultivator freedom from the destruction of his crops by the ravages of insects. It will be the greatest source of economy; it will encourage his efforts and his labor, and increase the value of his home. It should teach us humility, and impress upon us our dependence upon the results of the workings of natural laws and our inability to cope with the most apparently insignificant of living insects.

FRUIT AND TREE QUARANTINE.

Through our system of quarantine laws and regulations thousands of trees and plants, on being inspected on their arrival from foreign countries and found infested by dangerous insect pests and tree diseases, have been condemned and destroyed, and thus the pests and diseases upon them were prevented from spreading to the orchards of the State. Several cargoes of fruit were held in quarantine until all were carefully disinfected before being allowed to be placed on the market. Every steamship and sailing vessel from foreign ports is inspected on arrival, as also every shipment of fruit or trees from outside of the State. Great care is exercised in examining nursery stock and fruit. This work is in charge of an expert, a careful and painstaking officer. No plant, tree, or anything upon which there would be the slightest danger of conveying insect pests or diseases is allowed to pass until carefully inspected.

Most all transportation companies have rendered us material assistance in carrying out all laws relative to horticultural quarantine, for which we feel grateful. The Southern Pacific Company issued a circular (No. G. F. O. 5) letter of instruction to its agents in California, which says:

"The attention of all employés is called to the State law to protect and promote the horticultural interests of the State. This law, together with its regulations, established from time to time by the State and County Boards of Horticulture, must be observed in all particulars, and no excuse will be accepted for failure to comply therewith. All agents must keep themselves fully advised of all horticultural ordinances passed, names, districts, and addresses of inspectors appointed by the county in which their stations are located, and will coöperate with and follow all instructions of said inspectors, that by joint effort of the company and the various horticultural boards the best interests of the State may be served. After agent has notified the quarantine guardian of his district to call and inspect property, and if no attention is given within two days, the property may be delivered consignee without inspection, provided the shipment has originated at some point within the State of California. If shipment has originated outside of California, agent will notify the local quarantine guardian as provided, and if he fails to act promptly, will request this office by telegraph to notify the State Board of Horticulture, and continue to hold the property until attention is given. Agents are hereby forbidden to deliver any trees, plants, cuttings, grafts, buds, cions, seeds, or pits received from any point outside of the county in which their station is located, until such shipment has been inspected by the official duly appointed for the district in which said station is located. If no county horticultural quarantine has been authorized by the Board of County Supervisors, inspection is not required unless the shipment originated outside of the State of California, in which case property must be held until inspected by the State Board of Horticulture."

Other States and countries have followed our State's example in prohibiting infected fruit, as well as plants, trees, etc., to land unless free from infection or until thoroughly disinfected. The Government of the

Cape of Good Hope has established a fumigating station, and all fruit entering the colony is placed in closed air-chambers and subjected to a treatment of hydrocyanic acid gas before it is allowed to land. All trees, plants, etc., are placed on an iron frame, a canvas tent lowered over them, and are also subjected to the same treatment as the fruit. (See Plates IV and V, redrawn from the Report of the Government Entomologist of the Cape of Good Hope for 1897.)

European countries are legislating against the admission of infected fruit, and the experience of the present season's shipments should teach shippers that the only way to sell fruit abroad is by growing it clean and healthy, and the necessity of careful personal inspection to avoid losses of this kind in the future.

NATIONAL HORTICULTURAL QUARANTINE.

On March 6, 1898, a convention of horticulturists assembled in Washington, D. C. At this meeting a national horticultural bill was framed, having for its object the inspection and disinfection of all plants, trees, fruit, etc., entering the United States, such inspection to be performed at the port of entry and in a manner prescribed by the Secretary of Agriculture. With slight modifications which we offered, the bill received the approval of the fruit-growers of California in convention assembled at Sacramento, in November, 1897. Memorials to that effect were forwarded to Congress. When the bill was fairly on its way to passage there appeared on the files of the House of Representatives a "new born," styled H. R. Bill No. 6894. Under its provisions all inspections of trees, plants, etc., were to be left to officials whence imported, thus opening all our ports to the entry of all fruits and plants accompanied by a certificate of inspection by foreigners in foreign lands. To the passage of this bill we objected, and more strongly to the foreign certificate idea, to entitle plants, trees, fruit, etc., to be distributed over the Union, remembering that the pests that have damaged our orchards in the past twenty years were imported on trees which were guaranteed to be free from pests, as it has been well said, regarding the introduction of the purple scale, "We got the trees and the guarantee, now we have the pest and the guarantee." Armed with resolutions passed by the State Fruit-Growers' Conventions at Los Angeles and Riverside last April, and with the kindly assistance of our Senators and Representatives, and many of our citizens, we struck that abominable abortion, otherwise known as the Barlow bill, a blow that killed and buried it beyond resurrection. We favor a national quarantine bill, without interstate restrictions, as originally drafted by the

National Convention of Horticulturists, and are unalterably opposed to any measure inimical to the agricultural interests of our country, that has for its object the making of certificates valid in all places in the United States which are to be made on inspection in foreign ports that cannot be deemed disinterested.

As showing the absurdity of issuing certificates to nurserymen and importers, the following certificate is appended (of the many I have received for filing), issued by the State of New York:

State of New York, Department of Agriculture.

CERTIFICATE OF INSPECTION OF NURSERY STOCK.

This is to certify that the stock in the nursery of ——, of Floral Park, County of Queens, State of New York, was duly examined in compliance with the provisions of Chapter 482 of the Laws of 1898, and it was found to be apparently free in all respects from any contagious or infectious plant disease or diseases, or the San José scale or other dangerously injurious insect pest or pests.

Dated August 24, 1898, Albany, N. Y.
Duplicate of Certificate No. 130.
To be filed in the State of California.

C. A. WRELING,
Commissioner of Agriculture.

We have also on file certificates from foreign countries that have accompanied plants, trees, fruit, etc., and which shipments have invariably, after inspection here, been found infested by dangerous pests. Were it not for our laws and the vigilance of our quarantine officers, these plants would have been distributed over our State and the pests on them disseminated among the orchards, doing untold damage. Perhaps, then, we would think over the past as to how we got the trees and the certificates, or would wake from our slumber to find all we had left to be the pests and the certificates.

INFECTED FRUIT IN OUR MARKETS.

The State Fruit-Growers' Convention, held at Riverside on April 15, 1898, after a thorough discussion of the question, passed the following resolution relative to shipments of infected fruit:

WHEREAS, The shipment of wormy apples to San Francisco and other cities is detrimental to the interests of fruit-growers, as lowering the prices of good fruit and disseminating the codling moth all over the State; be it

Resolved, That this convention of fruit-growers recommend that the State Board of Horticulture take such steps as shall put in operation the laws framed to stop the transportation and exposure for sale of such infected fruit.

Regulation VI of the State Horticultural regulations provides:

"Fruit of any kind grown in a foreign country, or in any of the United States, or Territories, found infested with any fungi, blight, or other disease or diseases, injurious to fruit or to fruit trees, or to other trees or plants, is hereby prohibited from being offered for sale, gift, or distribution within the State."

In compliance with the wishes of the convention, as expressed in the resolution, there was issued a circular letter, in which the said resolution was embodied, and mailed to all the papers in the State, which they freely published and for which we make public acknowledgment. It stated in plain terms that the regulations of the State Board of Horticulture would be strictly enforced during the "present" season, and therefore it behooved every grower and shipper of apples and pears, particularly, to ship only sound and clean fruit. The commission men were asked to advise their consignors to be particular in this regard and avoid possible loss thereby.

Commenting on the circular sent out, the Watsonville "Register" of May 14, 1898, said:

> The State Board of Horticulture has sent out a circular announcing the intention of strictly enforcing the rule against the sale and shipment of wormy or otherwise diseased fruit. There ought to be no necessity for such regulations or action by the Board. The fruit-growers and shippers of this State ought to have business sense enough to avoid anything of the kind for their own sakes. Unfortunately, there are always some who have no sense, and will try to make a dime to-day by putting a bad article on the market, forgetful of the dollar they will lose to-morrow by such short-sighted policy. It is to be hoped that the fruit-growers of this valley will take harmonious action to secure the observance of this regulation, so far as their influence extends.

Many other papers likewise commented on the same, and advised growers to be cautious. When the first consignments of fruit reached San Francisco several were found to be infested, and were immediately placed in quarantine by the Quarantine Officer of the State Board of Horticulture. The enforcement of the law continued without fear or favor until, under advice of the Attorney-General, it was temporarily suspended, owing to a defect found in the regulations, which he said required amendment.

The Los Angeles County Board of Horticultural Commissioners issued to fruit-growers and fruit-dealers the following notice:

THE NEW HORTICULTURAL STATE LAW,

(Approved March 31, 1897,)

Adjudges and declares that all orchards, nurseries, or trees, shrubs, plants, vegetables, vines, fruit, or articles infested with scale insects, or codling moth, or other pests injurious to fruit, plants, vines, or vegetables, or with their eggs or larvæ, are a public nuisance.

And in conformity therewith, the Horticultural Commission of Los Angeles County hereby gives notice that all infected fruit must be cleaned of scale and insect pests on the premises where grown, and *not* in the packing-houses.

Local fruit-dealers will also take notice that *no* infected fruit will be allowed to be sold, or offered for sale, in this county from and after this date. Peddlers and fruit-dealers will be closely watched, and all violations of the law will be dealt with in a summary manner. Orchardist, clean your trees, and that will insure you clean fruit and save you the annoyance of having it quarantined when placed on sale.

By order of the Board of Horticultural Commissioners of Los Angeles County, California.

Dated November 5, 1897.

Regarding the effect the above notice had and the benefits resulting therefrom, C. G. Kellogg, Secretary of said Commission, says:

LOS ANGELES, CAL., November 18, 1898.

B. M. Lelong, Secretary State Board of Horticulture, Sacramento, Cal.:

DEAR SIR: The regulation adöpted by the Los Angeles County Commission has had a wonderfully good effect. The packers and dealers have in all cases shown a willingness to coöperate with the Commission in enforcing the regulation, and the effect was noticeable from the start. Of course, some of the orchardists who had been in the habit of marketing fruit infested with scale were very indignant, but when they found that the dealers favored the new order of things, the orchardists began to wake up, and in consequence this county has been able to market clean fruit, and the work of fumigation with hydrocyanic acid gas has during the past year been something wonderful. There were over 700,000 citrus trees in orchard fumigated during the year 1897 in Los Angeles County, and this season will probably exceed those figures, as there is constantly in operation at the present time in the county something over 700 fumigation tents. These tents are owned and operated by private parties, except about 100 tents owned by the county, which are leased to competent fumigators, and the county has entirely abandoned the work, leaving it with the orchard owners to select the party who suits them best. There is a good healthy competition among the owners of fumigation outfits, resulting in good work and reasonable prices. Our Commission looks after the work very closely to see that good chemicals are used and other necessary details are properly observed, thereby protecting the orchardists from imposition and insuring good returns for the money expended. Taken altogether, we are highly pleased with the result of the regulation.

SHIPPING OF GREEN AND UNWHOLESOME FRUIT.

The State Convention held at Riverside, in April last, passed the following resolution:

WHEREAS, It has been the custom of some dealers to pack and place upon the markets oranges which, because of unripeness and unwholesomeness, are unfit for consumption; therefore, be it

Resolved, That the State Board of Horticulture be requested by this convention to devise, if possible, some measure by which the Federal Government may prevent the sale of such fruit.

This question has been brought to the notice of our Representatives in Congress, and growers are asked to suggest some plan by which the intent of the resolution can be carried out. At present it seems as if our only relief would be from Boards of Health, who have the power to condemn unwholesome fruit. The Boards of Health of San Francisco and Oakland condemned considerable fruit during the past season that was found to be unfit for food. Last year they took much interest in the so-called cases of "strawberry poisoning," and traced the cause of such poisoning to unclean and often used boxes. The dealers and producers were requested, in their own interest as well as that of the consumer, to see that only new and clean boxes are hereafter used for packing fruit of any kind. But, strange to relate, there are always a few who do not propose to obey any law or order, if they can help it, and who continue to glut the market with fruit packed in dirty boxes; thus, the honest packer and the unsuspecting grower are compelled to suffer severely for the sins of those who will do anything to grab the almighty dollar. Every city in the State should have stringent ordinances prohibiting, under heavy penalty, the offering for sale, or as a gift, unwholesome fruit and fruit packed in packages that were used before.

DANGER OF IMPORTING INSECT PESTS AND TREE DISEASES INTO THE STATE.

Prior to 1880, fruit-growing in California was primitive; methods of culture were little understood, and little was known as to the character of soil required for the growing of the different fruits. Trees and plants were introduced, for experiment, from many parts of the globe and landed without inspection, as no horticultural laws then existed to look after such matters. From those trees insect pests spread to the orchards of the State, causing untold damage, but are now under control, although only after a great outlay of money. While we rejoice over the victory gained in eradicating some of the greatest enemies of the orchard, we can but sympathize with other States which have spent within a few years enormous sums in trying to stamp out the pests in their midst, and the work will have to be continued for several years before they will, if ever, be able to eradicate them. This State would have to make a similar warfare against them if they, or any of them, ever gained a foothold here.

Following are some of the foreign injurious insect pests whose introduction into the State is to be specially guarded against:

MORELOS ORANGE FRUIT MAGGOT (*Trypeta ludens*).

During the past season grave fears were entertained lest the Morelos orange fruit maggot should be imported into our State and eventually gain a foothold in our orchards, especially through carelessness and indifference displayed by commission men. This is a most disgusting pest, a single orange containing sometimes over a dozen maggots, and frequently with no external indications of their presence. All precautions possible have been taken to prevent its introduction into the State. A circular was issued warning transportation companies and commission men that all shipments of fruit arriving in this State would be thoroughly inspected before being allowed to land, and that in the event of any fruit being found infected by this pest, it would be promptly destroyed. The General Freight and Passenger Agent of the Mexican Railway was also notified, so that he could advise shippers of such fruit that it would be destroyed on reaching the State. He replied that he had done so. The Southern Pacific Company addressed us a letter expressing their willingness to coöperate in every way possible to prevent the introduction of the pest. The danger to the citrus interests of the State increases with the improved transportation facilities of Mexico. According to Howard the insect is found in the following localities in Mexico: Morelos, Cordova, Yantepec, Coatepec, Teoselo, Amacusac, Puenta de Ixtla, Jalapa, Toliman, San Luis Potosi, Pueblo Nuevo, Cuernavaca, Monterey, Linares, Montemorelos, Chihuahua, Guadalajara, Escalon, San Cristobal, Ameca, La Barca, Victoria, Tuxpan, Jalisco, Manzanillo, Acapulco and Guerrero.

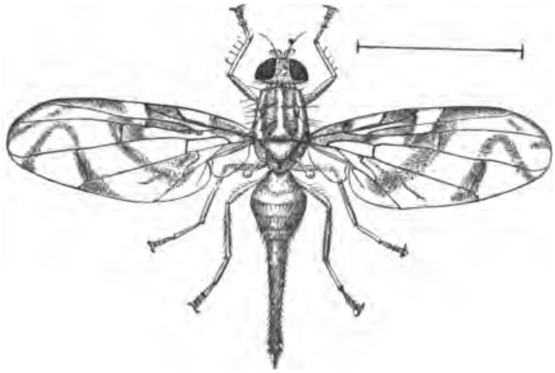


Fig. 1.
Female, enlarged. (Redrawn from Insect Life, by Howard.)

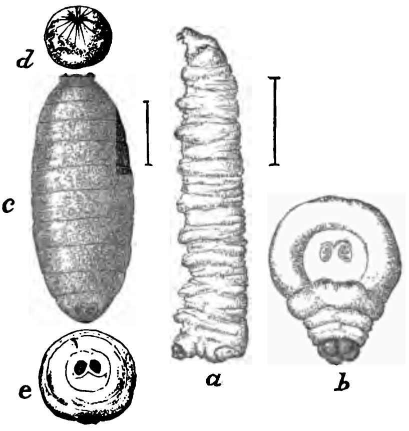


Fig. 2.
a, larva; *b*, anal segment of same; *c*, puparium; *d*, head of same; *a* and *c*, enlarged; *b*, *d*, and *e*, still more enlarged. (Reëngraved from Insect Life, by Howard.)

We are indebted to the Department of Agriculture for the use of the first thirteen cuts in this chapter, from an article on the Danger of Importing Insect Pests, by Dr. L. O. Howard, U. S. Entomologist, in Yearbook for 1897, pp. 529–552.

MEXICAN PEACH WORM (*Trypeta acidusa*).

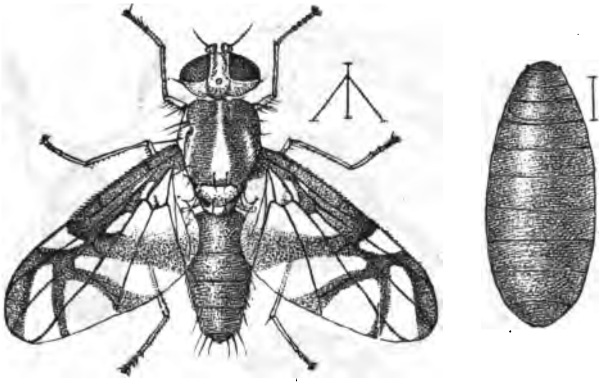


FIG. 3.
Puparium at right, adult at left, greatly enlarged (after Howard).

This species attacks the peach in the same manner as the Morelos orange fruit maggot attacks oranges, and is closely allied to it. It abounds in the States of Michoacan and Jalisco, Mexico.

AUSTRALIAN APPLE-ROOT BORER (*Leptops hopei*).

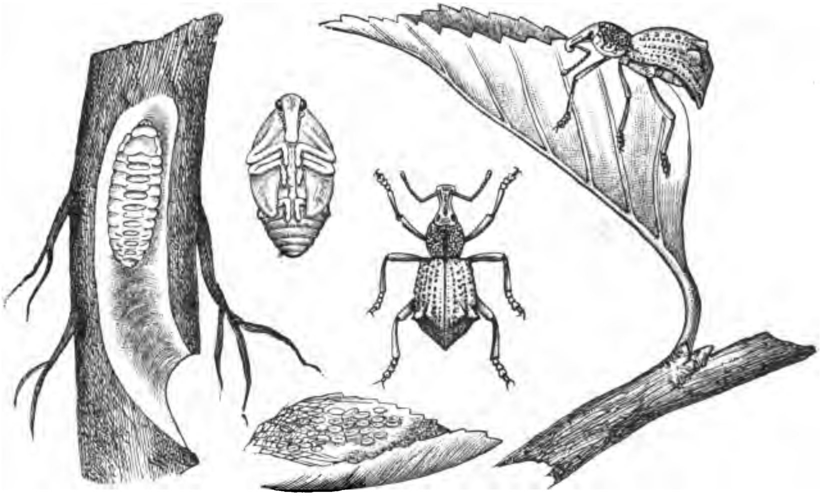


FIG. 4.
Different stages of the pest and method of work; natural size. (Redrawn from French & Kirby, by Howard.)

This apple-root borer has proved very destructive to apple and pear trees in Victoria, many trees having been rooted up and burned that had been attacked by this pest. Many others have since died. The larger roots of the trees were tunneled by the larvæ, and so great was the damage that saving the trees was out of the question.

AUSTRALIAN APPLE BEETLE (*Doticus pestilens*).

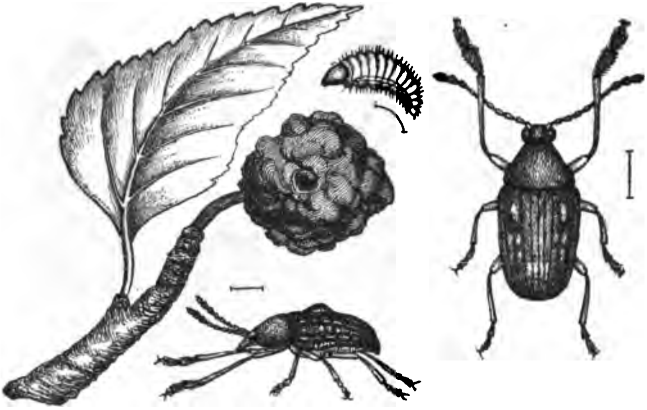


FIG. 5.

Larva and adult, and effect of work; insects enlarged. (Redrawn from French & Kirby, by Howard.)

This apple beetle attacks the apple crops of Australia, doing great damage, and bids fair to excel the codling moth in its injury. Unlike the codling moth, this insect causes the complete shriveling of the fruit and makes it unfit for any purpose.

HARLEQUIN FRUIT BUG (*Dindymus versicolor*).

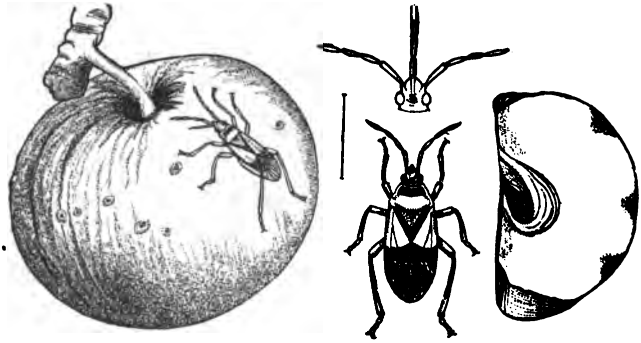


FIG. 6.

The insect and its work; natural size indicated by hair line. (Redrawn from French & Kirby, by Howard.)

This is a true plant bug and found only in the Australian colonies, where it causes great damage and loss to the apple crop, by inserting its beak into the sides of the apples, causing them to become spotty. Their eggs and even the perfect insects could be introduced upon trees from that country.

CHERRY BORER (*Maroga gigantella*).

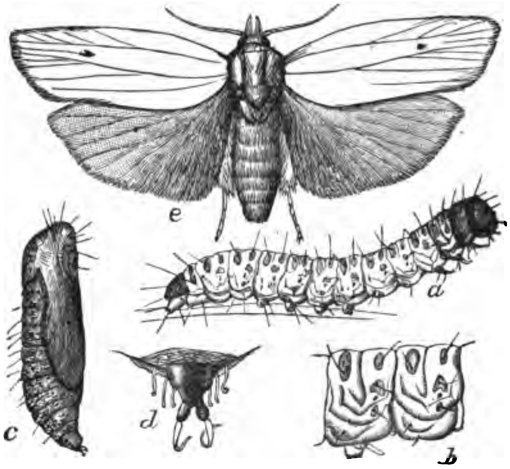


FIG. 7.

a, larva; *b*, segment of same; *c*, pupa; *d*, anal end of same; *e*, moth; all natural size, except *b* and *c*, which are enlarged. (Redrawn from Insect Life, by Howard.)

The larva of this moth destroys cherry trees, plums, apricots, nectarines, and even quinces. The larva first bores into the bark and then into the heart of the tree.

STRAWBERRY BEETLE (*Rhinaria perdix*).

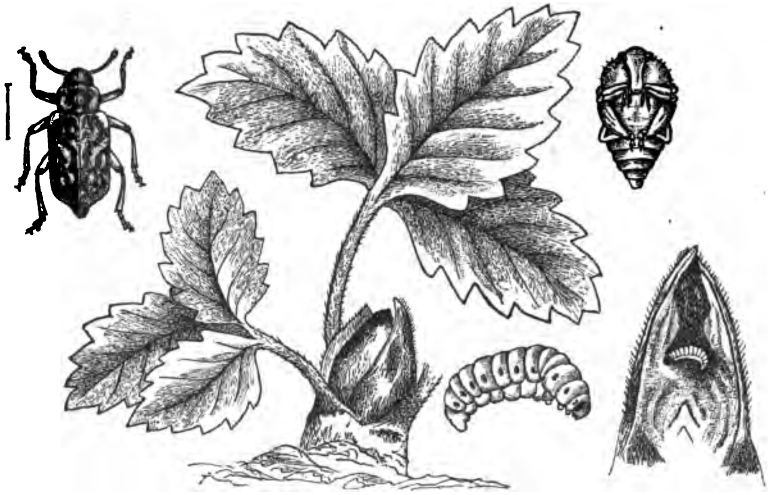


FIG. 8.

Different stages and method of work of the insect, slightly enlarged. (Redrawn from French, by Howard.)

This insect is reported to be a very serious pest to strawberry plants in Australia, and in some cases to the raspberry in Victoria. Both the flower and leaf stalk are destroyed by their tunneling. The larvæ eat large holes in the crown of the plant, killing it outright.

Peach Maggot of Bermuda (*Ceratitis capitta*).

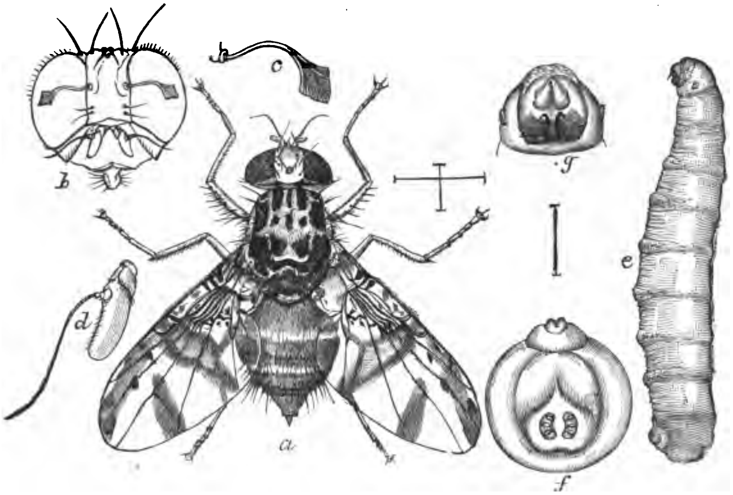


Fig. 9.

a, adult fly; *b*, head of the same from front; *c*, spatula-like hair from face of male; *d*, antennæ; *e*, larva; *f*, anal segment of same; *g*, head of same; *a* and *e* enlarged; *b*, *g*, and *f* greatly enlarged; *c* and *d* still more enlarged. (Redrawn from Insect Life, by Howard.)

This insect is widely distributed in the East Indies, in South Africa, in Mediterranean countries, and in Bermuda. It attacks peaches and has been found in oranges and other fruits. The damage done by this insect to the peach crop in Bermuda has been so great that many trees have been cut down as the fruit has been ruined by it for several years.

According to the report of the Government Entomologist of the Cape of Good Hope, South Africa, for 1897, it is the most serious pest the growers have to combat. At present, in order to grow fruit free from maggots of this fly, the trees are tented over with fine cloth, as shown in Plate VII, redrawn from the report above referred to. Fruit growing under such conditions becomes very expensive, and if it had to be practiced in this State would entail a greater expense than the returns of the orchards would justify. The area in fruit is too extensive, and the trees are too large for such a system to be applied with profit.

MAGPIE MOTH (*Abraxas grossulariata*).

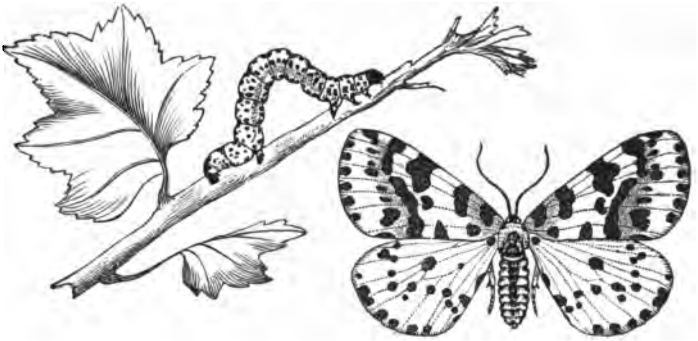


FIG. 10.

Larva and adult, natural size. (Redrawn from Ormerod, by Howard.)

The caterpillar of this moth feeds on gooseberry and currant bushes, and is widely distributed in Europe. It is very damaging to those plants, and no crop of berries can be had wherever they appear.

APPLE FRUIT-BORER (*Laverna herellera*).

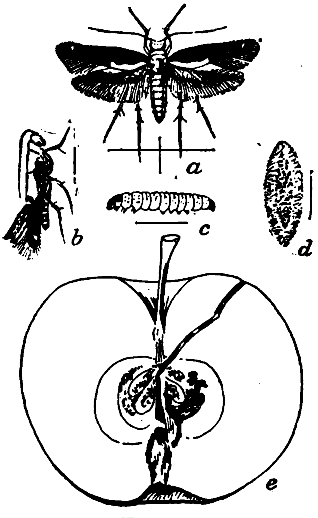


FIG. 11.

***a*, adult; *b*, same, side view; *c*, larva; *d*, cocoon; *e*, injured apple; all slightly enlarged, except *e*, which is reduced. (Redrawn from Matsumura, by Howard.)**

This apple fruit-borer is very damaging to the apple crops of Japan, and the most serious the growers there have to contend with. The larvæ burrow to the core of the apple, and in the course of a month mature and make a passage through the flesh of the fruit, crawl or drop to the ground, or emerge from the fallen fruit, making white cocoons in the earth and hibernating in the pupal stage. Some apples with indications of having been infested by this pest were taken from a passenger from Japan, by our Quarantine Officer at San Francisco. This pest is reported to be established at Victoria, B. C. That port has direct steamship connection with Japan.

SMALL ERMINE (*Hyponomeuta padellus*).

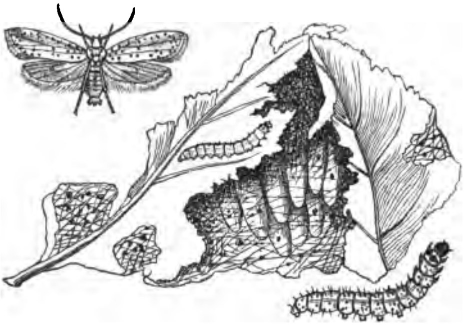


FIG. 12.
Adult larva and web, the latter containing cocoons, natural size. (Redrawn from Ormerod, by Howard.)

This is one of the most serious enemies of the apple in parts of Europe. The young caterpillars burrow into the young leaves in the spring and destroy the entire leaf.

PEAR FRUIT BORER (*Nephoteryx rubrizonella*).

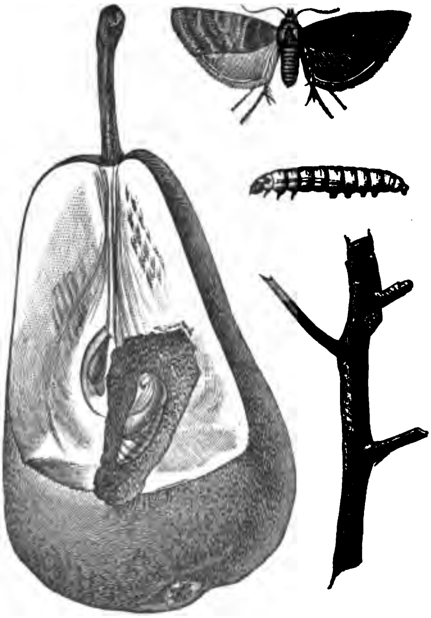


FIG. 13.
Adult above, larva just beneath; egg mass on twig at right; damaged pear with pupa at left; all natural size. (Redrawn from Matsumura, by Howard.)

This is a very serious pest to the pear crops of Japan, and from 30 to 40 per cent is lost annually. Dr. Howard says: "They hatch early in June, at the time when the fruit has reached the size of a cherry. The young larvæ spin a considerable amount of silken thread on the twigs and make their way to different fruits near by, which they puncture to the core, always leaving a blackish opening at their entrance. Their presence is readily detected by these holes. The larval stage lasts three weeks or more, and the pupal change is undergone within thin silken cocoons inside the fruit. The insect hibernates in the egg stage."

THE PEAR PSYLLA (*Psylla pyricola*).

This insect, of European introduction, has caused great loss to pear crops of New York. While it has been known for several years, the damage inflicted has been greater in the past seven years, and the loss sustained by its ravages has been enormous. It has spread from Salisbury, Conn., where it made its first appearance in 1882, to Massachusetts, New York, Illinois, Maryland, Virginia, and Canada. This insect belongs to the family of insects known as jumping plantlice, from the leaping habits of the adult insects. It spreads from orchard to orchard somewhat slowly, but in nearly all cases reported it has been taken to other localities on pear stocks.

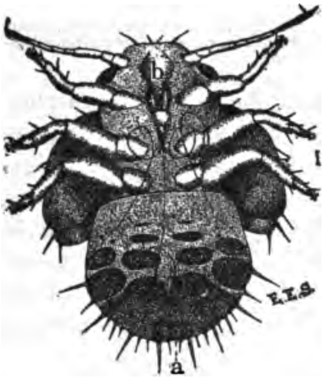


FIG. 14.
Full-grown nymph of the pear psylla, ventral view, greatly enlarged.

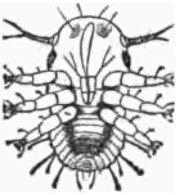


FIG. 15.
Newly hatched nymph of pear psylla, ventral view, greatly enlarged. (Reduced from figure by U. S. Dept. of Agri.)

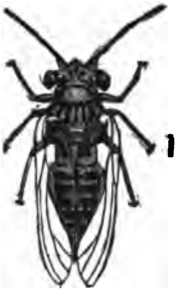


FIG. 16.
Psylla pyricola, the adult insect much enlarged.

THE BUD MOTH (*Tmetocera ocellana*).

This insect has of late played great havoc in the apple orchards of western New York, and is considered by the growers of that State to be one of the most destructive to orchards, and one of the most difficult to destroy. This bud moth is closely allied to the codling moth, which it resembles in size and form, but differs from it in structure, in color and its habits.

This moth is of European introduction and has been known in Europe for over half a century. In the East it was first discovered in Massachusetts in 1869. The same year it also appeared in Pennsylvania, where it did considerable damage, and in 1870 made its appearance in Canada, attacking plum trees. In 1879 it was found in Washington, D. C., and in 1885 in Nova Scotia. It was discovered in 1887 in Rochester, and in 1888 and 1890 in Maine, where it proved very injurious, damaging the apple and blackberry crops. It is now reported upon good authority to have gained a foothold near Portland, Oregon. The moth spreads very rapidly, but is most easily transported from one locality to another on nursery trees. The larva of the moth, in its half-grown state, passes the winter hidden under the flaps of buds, on the small limbs or twigs, or under some other convenient place, and in the spring makes its appearance in the locality where the tree is transported. The moth is reported to have but one brood a year, and usually lays its eggs in June and July. The caterpillars hibernate when half grown. This insect has so far proved very hard to combat, and no effective remedy has as yet been discovered.

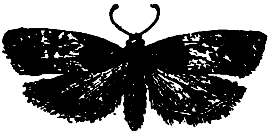


FIG. 17.
The bud moth—the adult insect, twice natural size; after Slingerland.

FIG. 18.
Caterpillar of the bud moth, about three times natural size; after Slingerland.

THE PLUM CURCULIO' (*Conotrachelus nenuphar*).

This insect is a very dangerous pest, and the most injurious known to the plum family. It abounds throughout the Eastern States, where, owing to its ravages, the culture of the plum and apricot has almost been abandoned. It also attacks the peach, the cherry, and the nectarine, and punctures young apples. So far it has baffled all efforts put forth to combat it. No effective remedy has as yet been found. We have exercised the greatest vigilance to prevent its introduction into our State. Should it appear here the prune interest would suffer immensely.

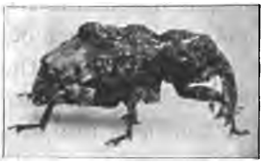


FIG. 19.
Adult plum curculio, greatly enlarged; after Slingerland.

THE GYPSY MOTH (*Ocneria dispar*).

In 1868 this insect was introduced into Massachusetts from Europe by a Frenchman with the view of experimenting with it for raising silk. Instead of proving beneficial they have caused great damage to that State, entailing an expense of nearly half a million dollars annually in combating them. All efforts in this direction have as yet proved only temporary, and whether the insect will ever be exterminated time can only determine. We append herewith six page illustrations from the Department of Agriculture of Massachusetts, showing the methods employed in combating the scourge, and which work will have to be pursued here if the pest should be introduced.

This insect feeds on apple, plum, cherry, quince, elm, linden, locust, maple, birch, oak, willow, poplar, arbor vitæ, and numerous other plants, including poison ivy, and in fact it is a question if any tree or plant would be exempt from its attacks.

THE CIGAR-CASE BEARER (*Coleophora fletcherella*, Fernald).

During 1894 the orchards of western New York suffered immensely from the attacks of this insect, which is considered a very serious pest. This insect is widely distributed throughout the State of New York, and is also very common in Canada and Nova Scotia. The species is very small and of peculiar habits in all its stages, and is therefore difficult to detect, except by the peculiar cases made by the larvæ, resembling a miniature cigar, through which its presence is observed. The moth is of a steel color and very delicate. The insect is so very small that only an expert can detect its presence on nursery trees. Great care must therefore be exercised to prevent its introduction into our State.

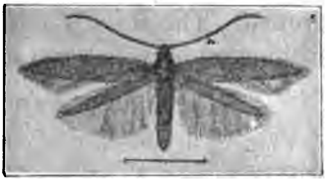


FIG. 20.
Cigar-case bearer—adult insect, about four times natural size.

QUINCE CURCULIO (*Conotrachelus crataegi.*)

(Figs. 1, 2, 3, and 4, Plate XII.)

This is one of the greatest enemies of the quince in western New York. Prof. M. V. Slingerland says: "During the past few years the quince curculio has caused a greater loss to some of the larger quince-growers in western New York than all the other insect foes and fungous diseases of the quince combined. In 1896, 95 per cent of the fruits in one large orchard at Lakeport, N. Y., were badly injured, and a very extensive grower at Geneva, N. Y., became so disgusted in trying to check the pest as to seriously contemplate uprooting his whole orchard." (Bull. 148, Cornell Univ. Expt. Station, May, 1898.)

The beetles "sting" the fruits, rendering them knotty and of an unsightly appearance; the larvæ burrow into the fruits, making them wormy and unfit for use.

THE OLIVE FLY (*Dacus olea*).

This is a very injurious insect, at present very abundant throughout the olive-growing regions of Europe.

Louis Figuier, in Insect World, p. 86, says: "This fly performs sudden and jerking movements; it keeps its wings extended, and rather jumps than flies. It is a destructive insect, *a perfect scourge*, which causes every two or three years a loss of five or six millions of francs to French agriculture."

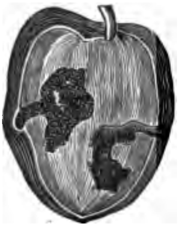


FIG. 22. Olive affected by the fly.

Consul Hathaway, in his report from Nice, in Fruit Culture in Foreign Countries, p. 633, says: "The fly lays its eggs in the olives, each fly laying about 400 eggs. The eggs hatch into maggots, which feed on the fruit during the period of development, which continues till the fruit ripens. The maggots cause the fruit to color prematurely, shrivel and drop to the ground. The fruit is rendered worthless for any purpose, except for making an oil which can only be used for lubricating."

QUEENSLAND FRUIT FLY (*Tephritis tryoni*).

This is, at present, one of the most injurious insects affecting fruits. It is quite prevalent throughout Australia. The fly lays its eggs in the fruit, from which maggots hatch, rendering the fruit unfit for any use whatever.

The Town and County Journal, of New South Wales (May 7, 1898, p. 22), illustrates the fruit fly, which is here reproduced (Plate VI). It says: " Beyond doubt it is the greatest enemy with which the fruit-growers of New South Wales have to contend. The codling moth used to be regarded as one of the greatest orchard pests, but the presence of that insect is a trivial circumstance when compared with the fruit fly.

"The life-history of *Tephritis tryoni*, Froggatt, may be briefly described as follows: The female deposits her eggs, by means of a fine ovipositor, under the skin of the fruit shortly before the period of ripening, but when newly made the puncture is so small that it is difficult to detect, and may, indeed, be easily overlooked. As the process of ripening advances, the presence of the pest is easily distinguishable. The spots where the skin has been punctured become dark, and decay begins to set in, with the result that the fruit falls prematurely to the ground. When newly hatched the maggots are semi-transparent, but as they approach maturity a dull yellowish color is attained. The larvæ live in the fruit until it becomes absolutely rotten, by which time, having fully matured, they crawl forth and burrow in the soil, burying themselves about an inch or so below the surface, for the purpose of pupation. The time occupied from the depositing of the egg to the appearance of the perfect insect is usually from five to six weeks. The imago measures about a quarter of an inch in length, but the wings, which are semi-transparent and iridescent, measure, when fully expanded, half an inch. The head is broad, and the eyes (in life) bluish green, but turning, after death, to a reddish-brown tint. The antennæ are yellowish, and have the third joint long, the latter being furnished with a strong bristle at its base. The thorax is stout, of a reddish brown color, with a yellowish streak on each side, and clothed laterally with a few long, coarse hairs. The scutellum is orange-colored. The abdomen is constricted in front, but bulges out toward the middle, from whence it tapers off sharply to its ultimate extremity. The color of the abdomen is reddish brown, with the exception of the first segment, which is yellow; the legs and feet are also yellow. There are, doubtless, several broods of the insect each season."

WESTERN AUSTRALIA FRUIT FLY (*Halyerophora capitata*).

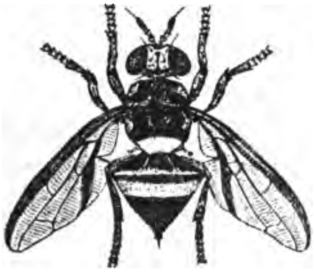


FIG. 23.

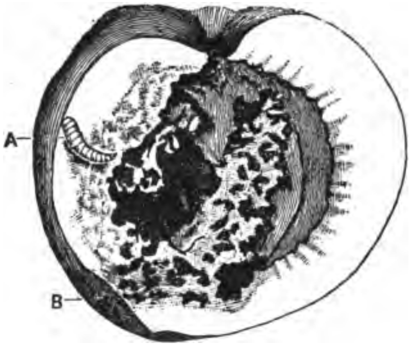


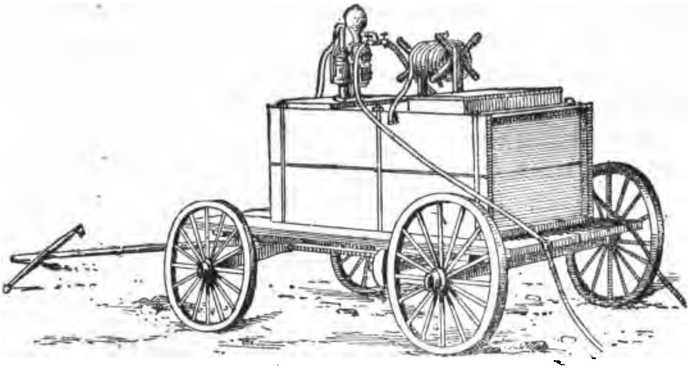
FIG. 24.

In Western Australia there is a fruit fly of similar habits to *Tephritis tryoni*, and is a great enemy to soft fruits. The maggots of the two flies are so nearly identical that none but the most competent observer would notice the difference.

The Journal of Agriculture of South Australia, of July, 1898, says: "The eggs of the fly are deposited in the fruit before it is ripe, hence it is impossible for any treatment to prevent the destruction of fruit when once attacked. The maggots, as they feed, gnaw irregular passages toward the center of the fruit, and cause the center to become rotten. The fruit when first attacked shows very slight evidence of being infested, but as it ripens it shows darker spots where the skin has been pierced by the fly. The maggot is similar in general appearance to the ordinary meat maggot, and can be easily distinguished from codling moth and other caterpillars by the general elongated form, the abruptly rounded posterior end, the two curious black hooks at the mouth, and the absence of legs. The only way to check this pest is to destroy all infested fruit and trap the maggots should they leave the fruit before it falls."

THE CONTROL OF INSECT PESTS.

Remedies for the Destruction of Insect Pests, etc., Approved and Recommended by the State Board of Horticulture.



A CONVENIENT SPRAYING APPARATUS.

LIME, SULPHUR, AND SALT WASH.

(For winter use upon Deciduous Trees.)

For pernicious scale, and as a preventive of curl leaf on peach trees, the following formula and directions, if properly carried out, will produce an effective solution:

Unslacked lime	40 pounds.
Sulphur	20 pounds.
Stock salt	15 pounds.
Water, to make	60 gallons.

Directions.—Place 10 pounds of lime and 20 pounds of sulphur in a boiler with 20 gallons of water and boil over a brisk fire for not less than one hour and a half, or until the sulphur is thoroughly dissolved. When this takes place, the mixture will be of an amber color. Next place in a cask 30 pounds of unslacked lime, pouring over it enough hot water to thoroughly slack it; and while it is boiling, add the 15 pounds of salt. When this is dissolved, add to the lime and sulphur in the boiler and cook for half an hour longer, when the necessary amount of water to make the 60 gallons should be added.

ROSIN WASH FOR PERNICIOUS SCALE AND LECANIUMS.

(For winter use upon Deciduous Trees other than Peach.)

The following are the proportions of materials for the winter wash:

Rosin	30 pounds.
Caustic soda (70%)	9 pounds.
Fish oil	4½ pints.

Directions for Preparing the above Wash.—Place the rosin, caustic soda, and fish oil in a large boiler, pouring over them about 20 gallons of water, and cook thoroughly over a brisk fire for at least three hours; then add *hot* water, a little occasionally, and stir well until you have not less than 50 gallons of hot solution. Place this in the spray tank and add cold water to make the necessary amount. Never add *cold* water when cooking.

SUMMER WASH.

(For Pernicious Scale, Fungus, etc., upon Deciduous Trees.)

Whale-oil soap (80% strength)	20 pounds.
Sulphur	3 pounds.
Caustic soda (98%)	1 pound.
Commercial potash	1 pound.
Water, to make	100 gallons.

Directions.—Place sulphur, caustic soda, and potash together in about 2 gallons of water, and boil for at least one hour, or until thoroughly dissolved. Dissolve the soap by boiling in water; mix the two and boil for a short time. Use the solution warm.

ROSIN WASH NO. 1 FOR CITRUS TREES.

(For Red Scale; apply in August and September.)

Rosin	20 pounds.
Caustic soda (70%)	6 pounds.
Fish oil	3 pints.
Water, to make	100 gallons.

The directions for preparing this wash are the same as those given for the rosin wash recommended for winter use upon deciduous trees. August and September are the best months to spray citrus trees.

ROSIN WASH NO. 2 FOR CITRUS TREES.

(For Newly Hatched Black or Brown Scale; apply in August and September.)

Rosin	18 pounds.
Caustic soda (70%)	5 pounds.
Fish oil	2½ pounds.
Water, to make	100 gallons.

The directions for preparing this remedy are the same as given for the rosin wash for winter use upon deciduous trees. In most districts of the State the black scale have hatched before the end of August, therefore September is a good time to apply this remedy.

KEROSENE EMULSION FOR OLIVE TREES.

(For Black Scale; apply in August and September.)

Directions for making emulsion:

Kerosene oil (Pearl 150° test)	5 gallons.
Common laundry soap	1¼ pounds.
Water	2½ gallons.

Dissolve the soap by boiling in 2½ gallons of water, and while boiling remove to another vessel; add the kerosene and churn for fifteen minutes, or until a stable emulsion is formed. Afterward dilute with 6½ gallons of hot water for each gallon of oil, and to the mixture add 2½ pounds of home-made soap dissolved in hot water. Apply at a temperature of 140° F.

FOR COTTONY CUSHION SCALE.

Secure a colony of *Vedalia cardinalis* or *Novius koebelei* and liberate on trees.

FOR CANKER OR MEASURING WORMS.

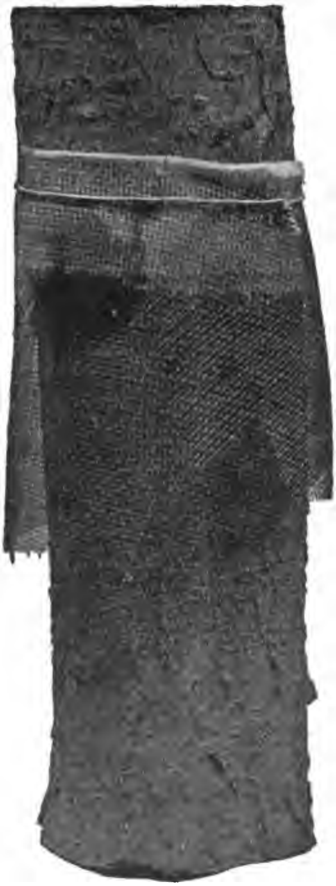


FIG. 25.
CANKER WORM TRAP.

The wingless female moths should be prevented from climbing the trees to deposit their eggs in the fall. This can be done by placing a wire-netting trap, as shown in Fig. 25. First place around the tree a piece of cotton batting, and then a strip of wire netting of No. 16 mesh, six or eight inches wide. Tie at top with cord or wire. See that the netting does not touch the tree at bottom. The insects will collect under it and go up as far as they can, being attracted by the light through the netting, and there perish. The season of oviposition in California is from the beginning of November until the end of December. After the female has ceased crawling or hatching the traps should be removed and scalded, as eggs deposited on them will hatch, and the minute larvæ will get through the mesh. The trunks of the trees below the trap should also be scrubbed or coated with a thick whitewash.

Remedy Against the Larva.—Spray the infested trees with one pound of Paris green to 200 gallons of cold water. To make the Paris green more insoluble, and thereby prevent injury to the leaves, dissolve six pounds of fresh lime in water and add the latter to the solution. Keep the mixture constantly stirred when spraying.

FOR APHIS UPON PLUM, PRUNE, AND APPLE TREES.

Caustic soda (98%)	1 pound.
Rosin	6 pounds.
Water	40 gallons.

Directions.—Prepare as directed for "rosin wash for winter use."

FOR FLOWERING SHRUBS OR GARDEN PLANTS.

Whale-oil soap (80% strength)	½ pound.
Water	1 gallon.

Directions.—Dissolve soap by boiling, and apply at a temperature of 100° to 120° F. For very tender plants the proportion of soap should be less.

FOR FLAT-HEADED BORERS.

Guard the stems of trees from infection by placing a shake or board on the south and west sides of the tree, which protects them from sunburn; or give a coating of whitewash containing some soap and sulphur. In removing a borer, smear the wound over with grafting wax.

FOR PEAR OR CHERRY SLUGS.

Use the Paris green solution, as recommended for canker worms, or throw dry pulverized soil or dust over the infested trees. This adheres to the slugs, causing them to drop to the ground, where they die.

FOR TENT AND TUSSOCK MOTH CATERPILLARS AND OTHER LEAF-EATING WORMS.

Spray with Paris green, as recommended for canker or measuring worms.

FOR PEACH-ROOT BORERS.

The deciduous fruit-growers have suffered greatly by the peach-root borer (*Sannina pacifica*), which has destroyed their trees in large numbers. The larva, or borer, is a pale yellowish, cylindrical grub, when fully grown measuring nearly half an inch in length. Many devices and remedies have been used to check its work, and while many possessed great merit, none proved entirely successful.

Remove a few inches of the soil at the base of the tree in April, before the moths deposit their eggs, and wrap up the trunk for ten inches with stout paraffine paper, tie at top, and pile up against the paper a few inches of dry soil. In the winter remove the protectors, and examine the trees for borers. If gum exudes it is generally an indication of the presence of a borer. Carefully remove the bark with a sharp knife, and destroy the pest. Place sand against the wound, and replace the protector. A coating of whitewash, in which a little soap and sulphur have been mixed, and applied to the bark at the base of the tree, will prevent the moths from depositing their eggs.

In the spring of 1898 experiments with bisulphide of carbon proved very encouraging, so much so that many growers applied it to all their trees. As is always the case with a new remedy, some that used it with care met with success, while others killed or injured a great many of their trees.

The remedy is possessed of great merit, but one requiring great care in its application. The liquid is applied in various ways, but the most commendable is the injection of the same into the soil, about a foot from the stem of the tree, with an oil-can, or digging a shallow furrow around the tree, placing the liquid into it, covering the same promptly. The best results were obtained where the soil beneath the tree was thoroughly pulverized and the liquid applied when the soil was moderately dry and porous. From one to three ounces to the tree is used, according to size.

FOR WOOLLY APHIS (*Schizoneura lanigera*).

Many remedies have been used against this pest, but with only partial success. Hot water poured about the roots while the trees are dormant has lessened the insects and greatly benefited the trees. The rosin solution has also been used with beneficial results, by pouring on the roots and swellings and by spraying on the trunks and infested limbs.

The past season extensive experiments were made with bisulphide of carbon, some with excellent results, while others did much damage to their trees. It was used in winter. The soil was loosened and the liquid injected into the soil. The best results were attained where the soil was moderately dry and well pulverized. Care must be exercised not to apply the liquid too close to the tree or its roots, as they will be injured. From one to three ounces of the liquid to the tree was used, according to size.

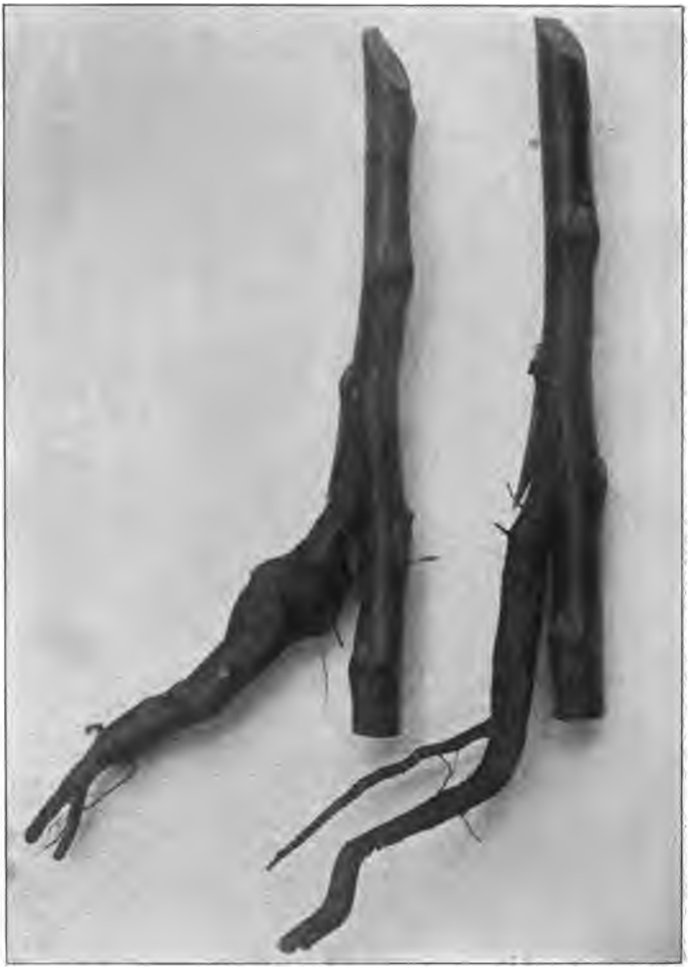
Aphis-Resistant Stocks the Only Sure Solution of the Difficulty.

The "woolly aphis," so called, is well known to nearly every apple-grower. All remedies, however effectual, have given only temporary relief. In Australia so deadly had the attacks of this insect become that apple culture was almost abandoned, until the discovery of aphis-resistant stocks. It was discovered that the Northern Spy on its own roots was absolutely aphis-proof. Other varieties, such as the Winter Majetin, Gravenstein, Duchess of Oldenburg, New England, Pigeon, Striped Beaufin, Perfection, Lord Woolsey, and Irish Peach, were also found to be aphis-proof, but the Northern Spy is the most preferable.

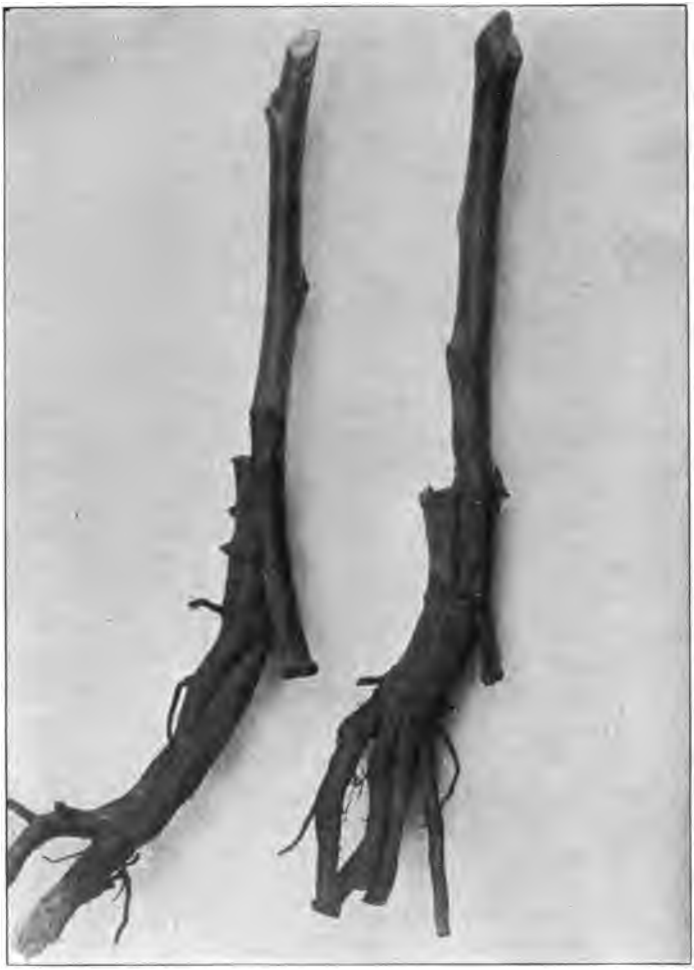
In this State, Rawle's Janet and Golden Russet have been known to somewhat resist the attacks of the aphis, but are not absolutely aphis-proof.

There are three methods of growing aphis-resistant stocks in Australia.

First method: Is to side graft a piece of any kind of apple root in



Root grafting—new method—showing how the piece of root is inserted into the cion. Roots are emitted by the cion at its base. After a season the plants are taken up and the piece of root removed, leaving the plant on its own roots.



Cleft root graft (after five weeks) showing callous at union of the cion and root, also at end of cion where roots are emitted.

an oblique cut on a resistant cion two inches from its base. (Shown in Plate XIII *a*). The cions emit roots of their own below the inserted root; the following winter the plants are lifted and the piece of root that was grafted on is cut clean out, leaving, of course, the young plants now on their own roots.

Second method: Another method pursued is to propagate the species by their own roots as root cuttings; in planting the roots leaving the smallest trace only above the surface. These root cuttings make fine trees and are fit to regraft the following season. Northern Spy cions are also grafted on their own roots; likewise, Northern Spy and Majetin cions are also worked on Northern Spy roots, or Northern Spy on Majetin roots. It seems to make but little difference either way; they are aphis-proof stocks, and all varieties worked on them do well.

Third method: This differs but little from the first method. The young apple seedlings are taken up in January or February, the roots washed of all dirt, etc., and cut into lengths of about four inches. There are various ways of uniting the root and cion, but the *whip and tongue grafts* are the most preferable. The cions and roots being prepared are united to the root (See Plate XIII *b*) as follows: An oblique or sloping cut or tongue is made in the root and the cion is likewise prepared, which is cut from four to ten inches long, and united with the root, leaving to it a projection from one to two inches long below the point of union. As each graft is made it is tightly bound with strips of calico or cotton cloth to keep the parts in place, or can be wrapped with strips of waxed paper. These decay shortly after the planting of the graft. The secret of success is the same as in all grafting. The inner bark of the cion and root must be in close contact at one or more points. The union only takes place where these parts are associated. The grafts are then put away in sand until planting time in February, in the following manner: On the floor of the propagating house or shed, sand is spread out at a sufficient depth to cover the grafts. The grafts are stood up or laid down at an angle of 45°, in bunches or loose, and covered with sand to within an inch or two of the top. They are kept in the sand until the cion and root callous over; they are then taken out of the sand and planted in nursery. While they are in the sand, care must be exercised that they be not too wet, as the bark of the cion and the root are liable to decay; again, they must not be allowed to get dry, or the bark of the grafts will shrivel and prevent a union of the two—cion and root. In the spring, when the grafts start, all shoots should be removed except one, the most vigorous of all, which is to form the tree. In a year the young trees—entirely aphis-proof—are ready to be planted to orchard, or if other varieties are wanted, they are budded over or grafted. In budding or grafting non-resistant varieties on resistant roots, it should always be done above ground, in order to prevent the formation of a system of roots by the non-resistant variety so worked.

Note.—A root from a Northern Spy tree, unless grown under the conditions herein mentioned, is *not* a Northern Spy root, and seedlings grown from Northern Spy seed are not always resistant.

THE CODLING MOTH (*Carpocapsa pomonella*, Linn.).

The early brood of moths appear about the time the opening of the apple, pear, and quince blossoms, when the female deposits her eggs on the fruit, leaves, etc., just as the fruit is forming. Until recently it was supposed that the female moth deposited her eggs single in the calyx of the fruit. Recent observations, however, have revealed the fact that the moth not only lays its eggs on the leaf, but have also been found on the twigs and on the surface of the fruit. Invariably, however, the instinct of the insect seems to be to enter the fruit through the blossom end. The egg, which resembles a small whitish spot, is shown on the fruit in Figs. 2, 3, and 4, Plate XXIV, and how it is laid on the surface of the fruit—after Slingerland.

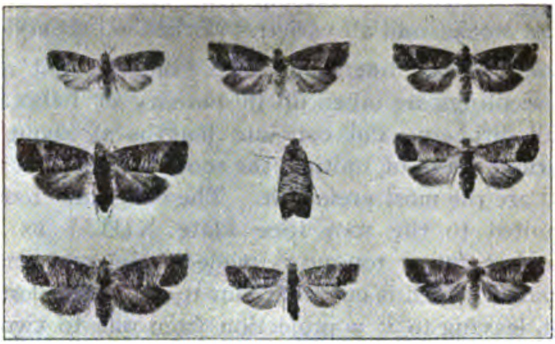


FIG. 26.

Pictures of the Codling Moth, showing its variations. All natural size, except the two large ones, which are enlarged twice. After Slingerland.

* "These pictures give a good idea of the shape, size, and general appearance of the egg. They have been aptly characterized as resembling a minute drop of milk, adhering to the skin of the fruit."

In the light of recent observations it seems remarkable how the notion that the eggs of the insect are laid *on* or *in* the so-called calyx or blossom end of the fruit has clung to the literature for nearly a century and a half.

During the past year Mr. Card has found the eggs in Nebraska. He states that "Instead of being laid in the calyx, we find that the eggs are laid almost exclusively on the upper surface of the leaves, in the orchard, though in confinement they may be laid anywhere. They are usually found on the leaves of a cluster associated with an apple."

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* Prof. M. V. Slingerland, in Bulletin No. 142, Cornell University, 1898.

* "In the light of these definite facts, the old stereotyped notion that the eggs are usually laid *in* the calyx must be discarded. The eggs may be glued anywhere it happens—to the surface of the fruit, to the stem, or even on the adjacent leaves."

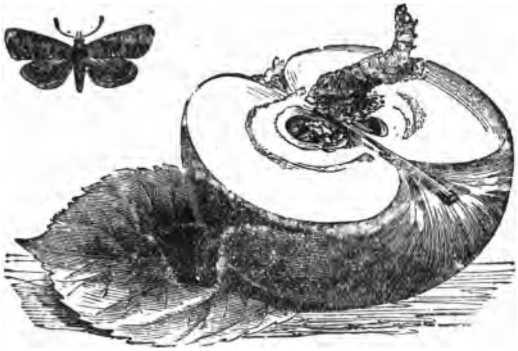

FIG. 27.
Codling Moth and full-grown Larva, showing how the latter leaves the fruit.

The eggs hatch in about from four to ten days, and the tiny worm at once begins to eat through the apple to the core. As the larva approaches maturity it eats a passage through the side of the fruit. The body of the larva is of a flesh color or pink tint, more highly colored on the back. The larva attains full size about three or four

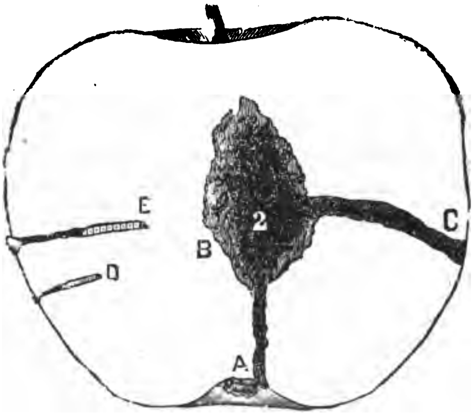

FIG. 28.
A. The blossom end of the apple, where the codling moth larva is supposed to enter the fruit; B. Represents an empty space where carpillary ovarium, or shell containing seeds, was located before the entrance of the larva; C. Represents the burrow, or outlet, through which the larva makes its escape; D. The young larva in burrow; E. The young larva approaching maturity, nearly reaching the core.

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* Prof. M. V. Slingerland, in Bulletin No. 142, Cornell University, 1898.

weeks from the time of hatching. The apples that fall prematurely sometimes contain the larva, but most of them do not drop until after the larva has made its escape. The larvæ as they leave the fruit, while the fruit is still on the trees, let themselves down to the ground by a fine thread which they spin. They also crawl down the branches to the trunk of the tree; in either case they find their way to the trunks of the trees, or where there is rough bark, under which, and in cracks or crevices, they spin their cocoons. Inside of the cocoon the change to the chrysalis takes place (See Fig. 1, Plate XXIV); the change in the early brood occurs in about three days. The insect remains in this condition about three weeks, when the moth emerges from its chrysalis.

The second brood occurs usually during the latter part of July, and in a few days the female begins to deposit her eggs for the later brood of larvæ. This brood generally attacks the later apples and pears. The larvæ of this second brood generally mature in the early winter months, and if they escape from the fruit before it is gathered, secrete themselves under the loose bark of the tree. If the fruit be gathered before they have made their escape, they are carried on the fruit into the storeroom or packing-house, and as they leave the fruit, hide between the cleats of the boxes or between the rafters of the building, from which places they make their appearance as moths in the spring, to begin the work of the following season.

MOTH-CATCHING PLANT (*Arauja albens*).

The so-called "codling moth plant" was supposed to be an effective destroyer of this pest, because it often happened that several species of moths, butterflies, and bees have been caught by the blossoms of the plant. The blossom has its interior parts so arranged that a moth or a bee in inserting the tongue to suck the honey, finds it easy enough to get it, but cannot get out again—it is caught there by the tongue. The plant has been growing in many gardens of the State for more than ten years; it is a beautiful climber.

* "The accompanying cut is a very good representation of the plant, and shows the mode in which the insects are held, but the 'trap' is connected with the reproductive organs, and is therefore not seen in the above figures; it may be well to give a few words concerning it.

"If the corolla be carefully cut away, five small, black, shining objects will be seen. These are hollow, tubular, and have a slit extending from the top to the bottom. The margins are turned in. The flowers being white and slightly perfumed, attract the moths, most of which are night fliers, and when the insect alights on the flower, a drop of nectar is expelled, the proboscis is inserted, and to obtain the coveted sweet, passes down the flower and through the tube, described. This

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*T. W. Kirk, F. L. S., in Leaflets for Gardeners, No. 2, London, 1894.

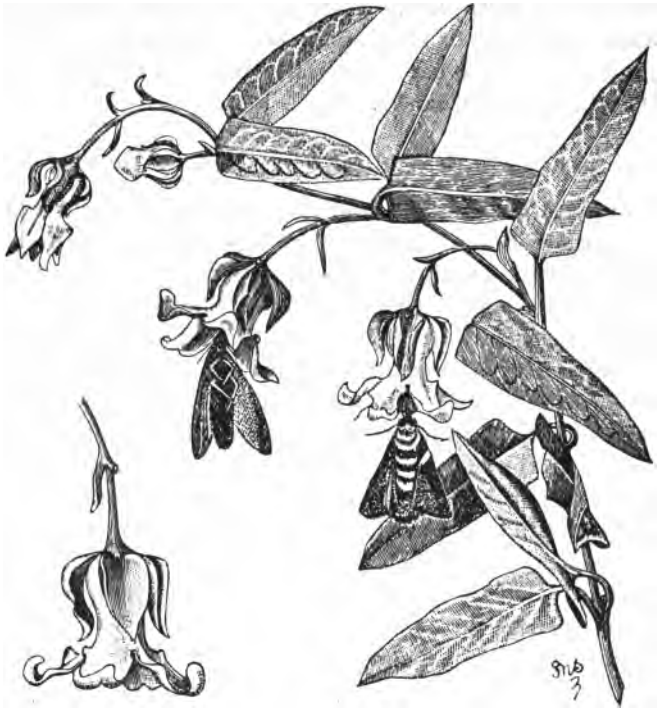

FIG. 29. FIG. 30.

Fig. 29, single flower, natural size, from nature. Fig. 30, spray showing moths captured by proboscis, reduced. After Kirk.

is easily accomplished, but when the owner attempts to withdraw his trunk, it is held fast, and the insect is a prisoner, held by its nose."

While the blossom of the plant does occasionally catch certain species of moths, butterflies, bees, etc., contrary to the general belief it has as yet *never* captured a codling moth.

NATURAL ENEMIES OF THE CODLING MOTH.

There are various insects that prey on the larva of the codling moth, but so far none have been found to be entirely effectual in reducing its numbers so that its attacks on the apple and pear crops would not be felt. A certain species of bat is supposed to feed on the moths at night, but as the codling moths do not fly at night, it is doubtful if the bats accomplish much good.

Professor M. V. Slingerland, of Cornell University Experiment Station, in Bulletin No. 142, on the codling moth, reports the breeding of a small internal parasite (*Trichogaramma pretiosa*), from eggs of the codling moth. Koebele also reports having found an internal parasite at work on the eggs of the moth in this State, but so far the general increase of this parasite is of little or no consequence. Several other parasites are reported, but so far none have materially reduced the pests in number so that its attacks would not be felt.

TRAPS FOR CATCHING THE CODLING MOTH.

On the supposition that the codling moths fly at night, and as most other species of moths are attracted by light, many devices have been invented to trap the codling moth, but the results have not warranted the expenditures made in this direction. The moth, no doubt, has a most peculiar instinct, probably entirely different from all others, for it is only at a certain time, towards sundown, and before night, that they have been observed flying the most. Few reports, indeed very few, have been made of observations where the moths have been seen flying in the middle of the day or at night. The many devices used to trap the moth have not yet revealed the fact of ever having captured a single codling moth. The writer has made numerous tests with many of the devices made for the purpose, and never as yet has he been able to find a single codling moth captured by them. The writer has also examined into the merits of most every trap invented for the purpose, and has not seen a single moth entrapped. The result of all observations by experienced entomologists everywhere has proved conclusively that the moth is not attracted by light, and that all devices for entrapping them have proved futile.

FOR THE DESTRUCTION OF THE CODLING MOTH.

Not to be sprayed during a hot spell, or north wind, or when the trees are in bloom.

Paris green (pure, or to contain at least 50% arsenious acid)	1 pound.
Water	200 gallons.

Use no ammonia or soap. Make the Paris green into a paste before placing into spray tank, and keep constantly stirred while spraying. Spray as soon as the blossoms drop, and before the fruit turns downward. A second application should be made about sixteen days after the first, and, where required, a third and even fourth application for late varieties, at three weeks intervals. To make the Paris green more insoluble, and thereby prevent injury to the leaves, dissolve six pounds of fresh lime in water, and, when the lime has settled, add the water to the solution and keep it constantly stirred.

NOTE.—In orchards where the fruit is affected with apple scab, the Paris green can be added to a weak solution of Bordeaux mixture of 200 gallons. In buying Paris green growers should demand a guarantee that it contains at least 50% arsenious acid.

FOR RED SPIDER AND SIX-SPOTTED MITES.*

(For citrus trees; to be appled in summer.)

Caustic soda (70%)	10 pounds,
Sulphur	20 pounds.
Dissolve in water	20 gallons.

Take the sulphur, mix it to a paste—not sloppy—with cold water in a barrel, then add to this wet sulphur 10 pounds of caustic soda, 98 per cent, and it will boil the sulphur just like lime slacking; have 20 gallons of water to add to it as it boils, to prevent its burning. This is your stock solution, and when you get ready to spray your mites or spider, put 40 gallons of water in another barrel and take a half gallon of the stock solution and add to the 40 gallons of water, straining it to take out any sediment there may have been in the sulphur. Be sure you use *sulphur* instead of *yellow ochre.* Remember this is for mites and spider only.

This stock solution to be diluted one-half gallon to forty gallons of water, and applied with a spray pump under 100 pounds pressure.

FOR RED SPIDER OR YELLOW MITE ON DECIDUOUS TREES.

Soon after the trees are in leaf in spring, and while they are damp with dew in the morning, thoroughly dust them with sulphur. Use sulphur bellows, or, if the orchard is extensive, fix up a broadcast seeder on a wagon. With this arrangement an orchard can be treated very thoroughly and with dispatch. Infested orchards should be treated at least three times during the spring and early summer.

FOR GRASSHOPPERS OR LOCUSTS.

Thoroughly mix 40 pounds of bran, 20 pounds of middlings, and 20 pounds of arsenic; then add 2 gallons of cheap molasses and sufficient water to moisten the whole. Place a tablespoonful of the mixture a few inches from the tree or vine.

FOR PEACH MOTH (*Anarsis lineatella*).

The larva of this moth burrows into the tender shoots of the peach in the spring. Spraying in the winter with the lime, sulphur, and salt solution destroys the eggs deposited on the trees, and is a good preventive. Also, spraying with kerosene emulsion, applied from December 1st onward during the winter, is one of the best remedies to reach the young worms, as they are ensconced in thin, shallow burrows in the crotches of the limbs all through the trees. The kerosene penetrates the borings which cover them, and kills. The formula that has given the best results is as follows: Dissolve half a pound of washing soap in one gallon of boiling water. When dissolved pour while boiling into a vessel containing two gallons of kerosene oil and churn violently (or pump it back into itself with a force pump) for five minutes, or until it assumes a peculiar creamy condition, which can be readily recognized when it comes. This is a true emulsion. Take one part of this to six parts of warm water, and spray thoroughly.

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* Recommended by G. P. Hall, of San Diego, President State Association of County Horticultural Commissions.

THE HYDROCYANIC ACID GAS TREATMENT.

(For destroying scale insects on citrus trees.)

This treatment should be used in the night to avoid light, heat, and sea breeze, which neutralize the effect of the gas. The chemicals used for producing the gas are: Sulphuric acid (commercial), cyanide of potassium (98% to 99%), and water.

The following instructions must be carefully observed: First, the tent, which must be air tight, is placed over the tree; second, the tent is made air tight around the bottom, by throwing some loose soil over the bottom of the canvas; third, the necessary amount of sulphuric acid, together with the required amount of water, is put in a glazed earthenware vessel, and placed under the canvas, and the cyanide of potassium is added. A piece of sacking or burlap is thrown over the top of the vessel, to spread the gas and prevent it from burning the leaves immediately above the generator. The tree is left covered forty minutes.

PROPORTIONS OF CHEMICALS USED.

Recommended by the Riverside County Board of Horticultural Commissioners.

Height of Tree.	Diameter of Tree.	Water.	Cyanide C. P., 98 per cent.	Sulphuric Acid, 66 per cent.
Feet.	Feet.	Ounces.	Ounces.	Ounces.
6	4	2	1	1
8	6	3	1½	1½
10	8	5	2½	2½
12	14	11	5	5½
16	16	17	8	9
20	16-20	22	10	12
20-24	18-22	30	14	16
24-30	20-28	34	16	18
30-36	25-30	52	24	28

The cyanide should be used as coarse as possible, so that the chemical action will be less violent. The gas is also generated more evenly, and there is not so much danger of the chemicals boiling over or spattering the tent. As soon as the tent is removed the vessel is rinsed with clean water and prepared for another charge.

THE CONTROL OF FRUIT AND TREE DISEASES.

FUNGOUS DISEASES.

The fungous diseases affecting fruit crops in the State are not as numerous as the insect pests, yet some do equally as much damage. Unlike ordinary plants, fungi are destitute of leaves, flowers, or seeds, in the ordinary acceptance of the term, the productive bodies being known as spores, a name given to the fruit of all flowerless plants. These spores are exceedingly minute, often not more than the five-thousandth of an inch in diameter, are generally nearly transparent, extremely buoyant, and, forming at all times a considerable proportion of the atmospheric dust, are transplanted by the winds to remote distances. These spores are produced in numbers which, to one unfamiliar with the object, appear almost incredible. Nature seems to have provided with bounteous prodigality for the safety of the species of the low orders, both of plants and animals, and the number of germs produced is in almost constant ratio with the danger to which the organism is exposed. Countless millions of germs may perish, but species live on. Humid climatic conditions seem to favor fungous growths, and they need more general attention on the part of the growers, for they rank second on the list of destructive agents.

PEACH CURL LEAF.

This fungus is familiar to all orchardists, and is especially severe on some varieties of the peach more than on others. In the latest experiments, the following remedy* has proved the most effectual:

Copper sulphate (bluestone)	5 pounds.
Fresh lime	5 pounds.
Water	50 gallons.

Dissolve the bluestone in 8 or 10 gallons of water; slake the lime in water enough to make a creamy whitewash and strain through a coarse gunny sack. Put the two together and add necessary quantity of water; stir thoroughly, and the mixture is ready for use. The best time to apply the remedy is when the trees are dormant in the winter and before the blossoms or foliage appear.

The Bordeaux mixture No. 2, from one to three applications, after the leaves unfold, and the salt, sulphur, and lime remedy in winter, are also very efficacious.

SHOTHOLE FUNGUS.

The apricot seems to be the favorable food plant for this fungus, although other trees, like the plum, suffer from its attacks. It makes its appearance on the leaves in round spots of a dark brown color. The fungus penetrates through the cells of the leaf with great rapidity, the contracted cells separate from the healthy parenchyma, and are blown away by the wind, leaving the leaf perforated by holes. The fungus is now quite well distributed throughout the State, but is more troublesome in the orchards along the rivers and in the coast counties. While it is first observed on the leaves, as they develop quicker than the fruit, it appears on the fruit when quite young, and the brown rusty spots give it the appearance of being infested by scale. At first the fungus appears as small pimples, which develop and burst open at the top; a scab is then formed, which spreads and dries on the surface of the fruit. It appears on the leaves in the same manner, with the exception that instead of spreading, it bursts, dries, and shrinks away, leaving a hole in the leaf. The fungus arrests the development of the leaf, which soon turns yellow and gives the tree a sickly appearance. It is very detrimental to the fruit, as the scab formed on the surface renders the fruit unfit for use, except where it is peeled or dried.

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* Successfully used at the Hatch & Rock orchards, at Biggs, Butte County, for several years, by George F. Ditzler, superintendent.

Remedy.—The Bordeaux mixture and the salt, sulphur, and lime remedy applied in winter, before the buds open, destroy a large percentage of the spores. After the leaves unfold the following remedy is the most effectual:

AMMONIACAL SOLUTION OF COPPER CARBONATE.

Copper carbonate	6 ounces.
Ammonia	3 pints.
Water	50 gallons.

Dissolve the copper carbonate in the ammonia and add the water. A second application with the same fungicide should be made twelve days after the first, and a third and fourth, if necessary, fourteen days intervening.

Caution.—Use no more ammonia than is required to dissolve the copper carbonate. Ammonia is variable in strength, and the amount required must be tested in practice.

APPLE SCAB.

Remedies.—The following are the most effectual:

BORDEAUX MIXTURE NO. 1.

Copper sulphate (blue vitriol)	4 pounds.
Quicklime (not air-slaked)	4 pounds.
Water, to make	50 gallons.

Dissolve the copper sulphate in about two gallons of hot water contained in a wooden vessel, by stirring, or even better, by suspending the sulphate contained in a cheese-cloth sack in a large bucketful of cold water. With the cold water and cheese-cloth bag a longer time is required. Pour the sulphate solution into the barrel or tank used for spraying, and fill one third to one half full of water. Slake the lime by addition of a small quantity of water, and when slaked cover freely with water and stir. Pour the milk of lime thus made into the copper sulphate, straining it through a brass wire strainer of about thirty meshes to the inch. Pour more water over the remaining lime, stir, and pour into the other; repeat this operation until all the lime, except stone lumps or sand, is taken up in the milk of lime. Now add water to make 50 gallons in the tank. After thorough agitation the mixture is ready to apply. The mixture must be made fresh before using, and any left over for a time should be thrown out or fresh lime added.

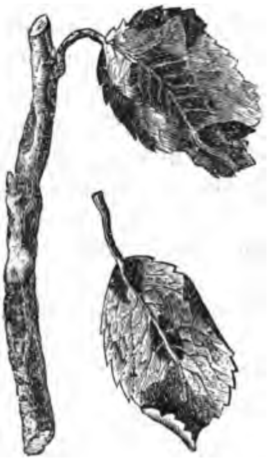


FIG. 31.

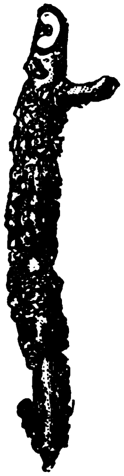


FIG. 32.

Figs. 31 and 32 show the effects of the fungus on pear branches and leaves. Fig. 31 is a one-year-old twig. Fig. 32 is a two-year-old branch.

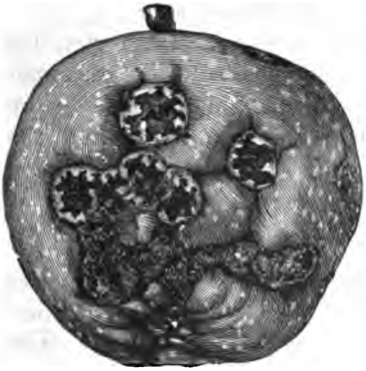


FIG. 33.

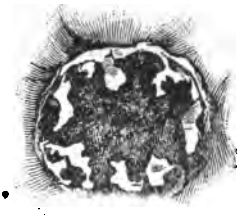


FIG. 34.

Fig. 33 shows the mode of the fungus on an apple. Fig. 34, a blotch—enlarged.

BORDEAUX MIXTURE No. 2.

Copper sulphate	2 pounds.
Quicklime	2 pounds.
Water, to make	50 gallons.

For use on such trees as have foliage injured by Bordeaux mixture No. 1.

Stock Solution.—A solution of copper sulphate, containing say one pound of sulphate to the gallon of water, may be made up and permitted to stand indefinitely in a covered barrel, if no lime is added. Such a solution is known as a stock solution. Two or four gallons of stock solution, according to the strength desired, are taken for each 50 gallons of mixture to be made. For extensive spraying a long trough or box of uniform width may be used in which to slake the amount needed immediately, which is placed in the trough and slaked with a small quantity of water. The whole is evenly spread and covered, as a putty, with water to exclude the air. This putty may be removed in calculated portions, placed in a tub and treated like the freshly slaked lime. By means of the stock solution of copper sulphate and the lime in putty state, much valuable time is saved in filling the barrels or tanks used in spraying.

Spray with Bordeaux mixture No. 1 just as the buds are swelling. Give the trees a second application just before the blossoms open, and the third application, if necessary, just after the blossoms drop. Care must be exercised in applying this remedy more than the third time, especially on white-skinned fruit, which is liable to be injured.

ALMOND FUNGUS.

This fungus affects the almond. It affects the leaves and young twigs, causing the former to fall early in the season, leaving the trees exposed to the hot rays of the sun, checking the flow of sap.

Treatment.—Professor Newton B. Pierce, Assistant Mycologist, has met with great success in the use of the ammoniacal solution of copper carbonate. He states that the first spraying should be made before the trees bloom, the second when the trees are in full leaf, and the third application about a month later, when the spring rains have ceased. The fungicide may be diluted with from 10 to 15 per cent or more water than the amount used.

APPLE BITTER ROT.

This fungus has made its appearance in various apple districts. The time to spray for this fungous disease is when it makes its first appearance. This should be followed by a second spraying two weeks after the first, and a third spraying, if necessary, two weeks later, with the ammoniacal solution of copper carbonate, as recommended for "shot-hole fungus."

PEAR CRACKING AND LEAF BLIGHT.

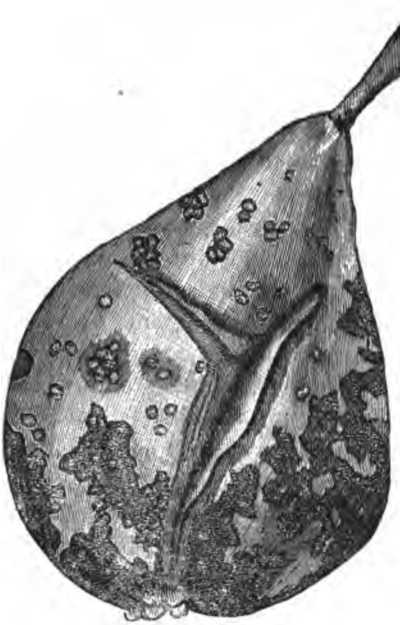


FIG. 35.

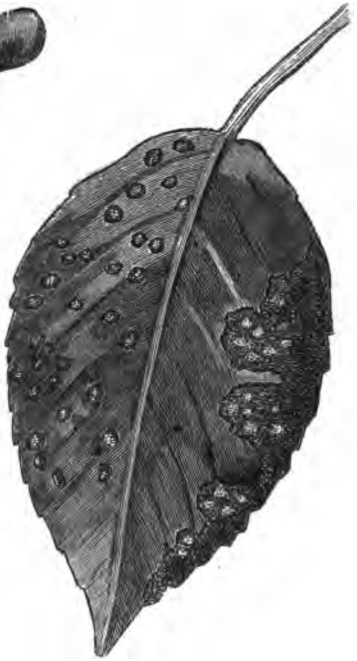


FIG. 36.

Fig. 35 shows the effect of the fungus on a pear (Dearborn seedling), causing it to crack; and Fig. 36 shows the effect on the leaf.

Remedy.—Use the Bordeaux mixture in winter before the buds begin to swell. When the leaves are about two-thirds grown a second application should be made, this time, however, using a solution containing the ingredients in the following proportions:

Sulphate of copper	6 pounds.
Lime	6 pounds.
Water	22 gallons.

Dissolve the copper in 16 gallons of water, and slake the lime in 6 gallons; then mix as described above. A third application may be made, if necessary. Where the trees are affected with codlin moth, Paris green (in the proportions recommended) may be added to the solution, which mixes quite readily, and its strength is not weakened.

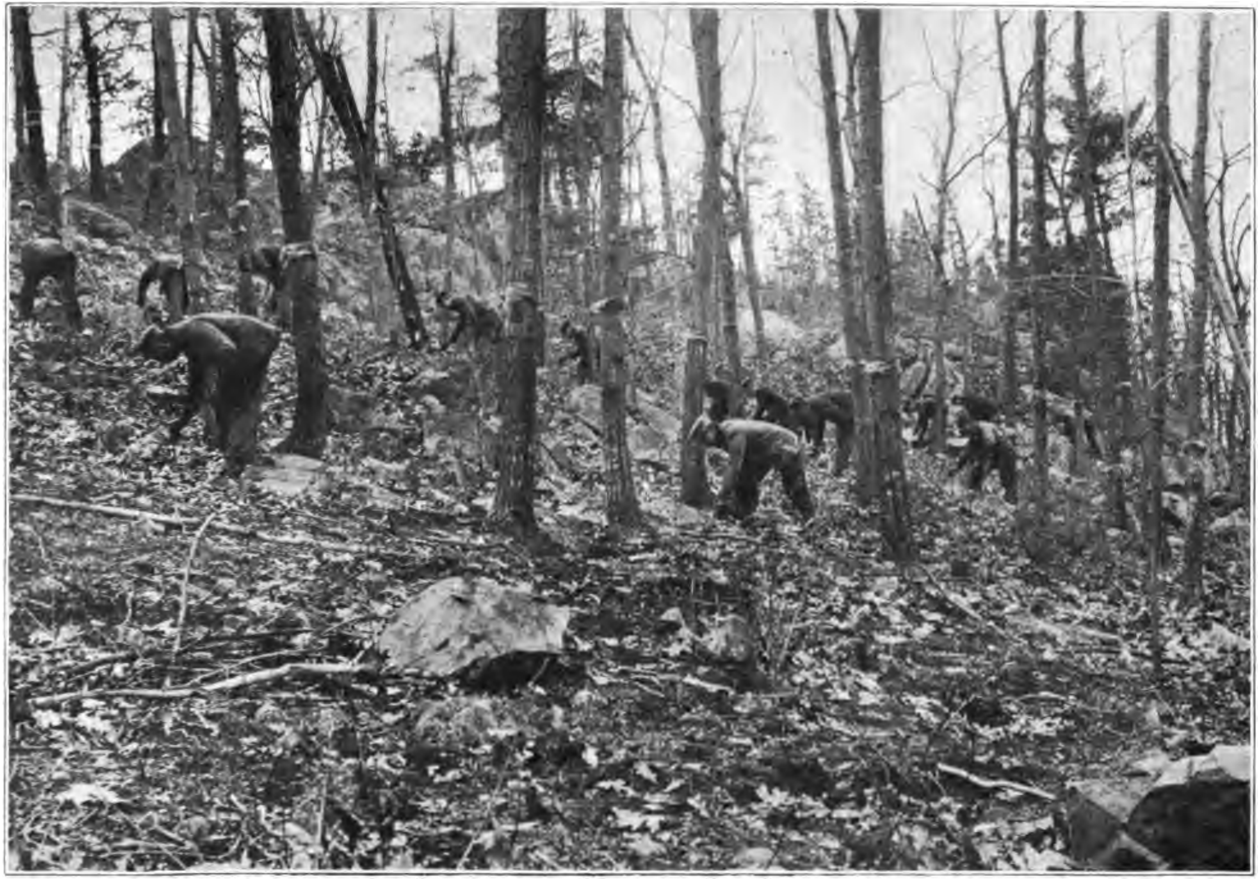
"ROOT KNOT" ON DECIDUOUS TREES.

This mysterious disease is widely known throughout the State. The following treatment has proved the most effectual: Cut away the knots in the fall and winter, and leave dry, then apply a saturated solution of bluestone to the affected parts with a swab. This may be repeated two or more times without injury to the tree. Then the dirt is thrown back and the roots again covered. The Bordeaux mixture applied in a similar way has given temporary relief to the trees.

Gum Disease on Citrus Trees.

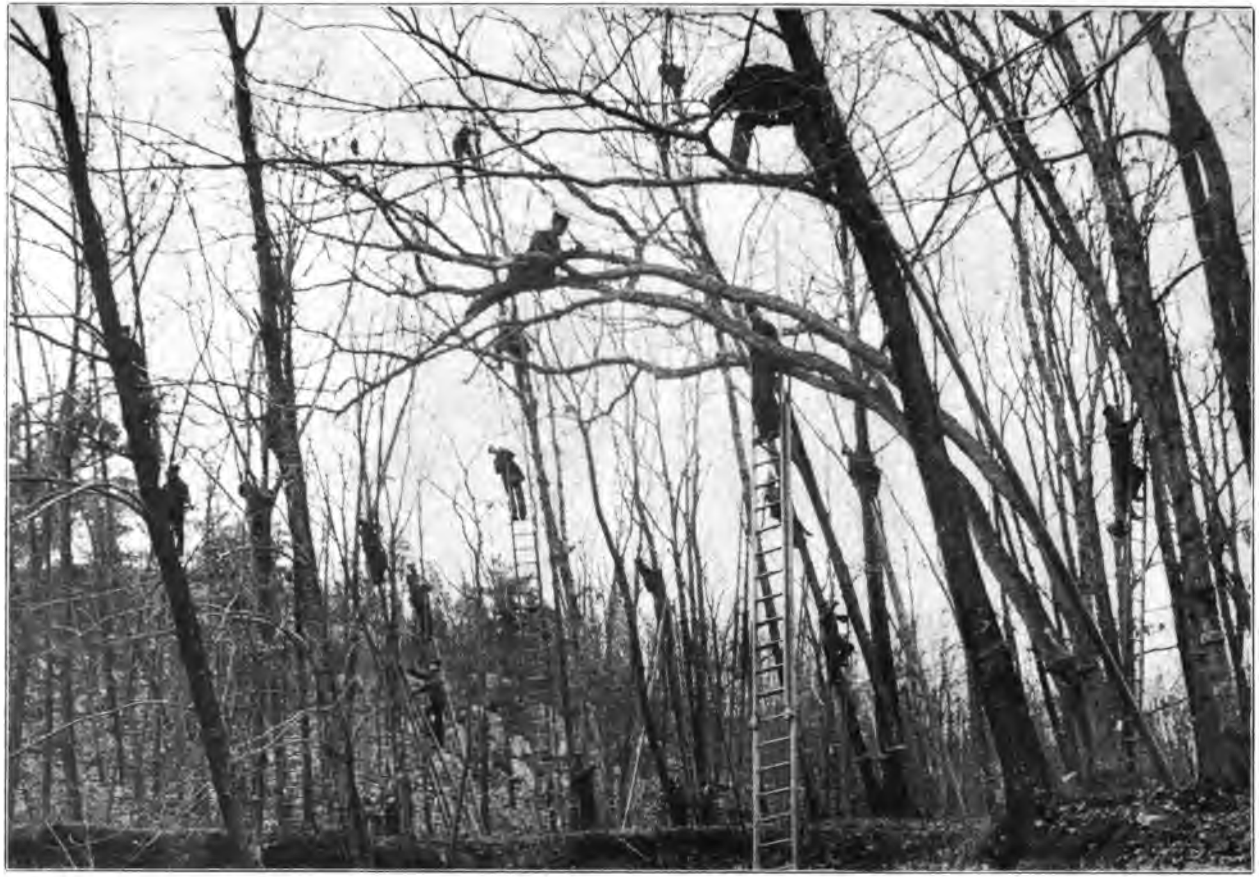
This disease is generally first detected on the trunk close to the ground, and is a yellow gum-like substance which forms on the outside of the bark. It is an exudation of the sap of the tree, which breaks through the bark and forms a gum. The disease develops under the bark, and also penetrates into the inner bark and into the wood. The exudation of gum appears principally in May and June, but may be observed at all seasons of the year. It is due to many causes, but primarily, no doubt, produced by improper methods of irrigation and cultivation. Trees have been planted in localities where the land is underlaid with a stratum of hardpan, making it impossible for the roots to reach out further than the excavations made for the purpose of planting, which in the majority of cases are made very small and shallow, just large enough to admit the young tree. In two or three seasons the holes become completely filled with roots, incapable of penetrating through the hardpan. The holes become filled with water after rains or repeated irrigation. The roots must remain therein, and as the water cannot escape except by evaporation, the roots become diseased. In many sections orange trees were planted under like conditions, which for a number of years grew luxuriantly and bore heavy crops. The experiment was pronounced a success and large areas were set out. Now all these plantings have succumbed to the gum disease, due to stagnant water at the roots.

Remedy.—If the disease is not of too long standing, it can be removed by cutting away the affected parts—every trace of the gum must be cut away—and the wound painted over with rubber paint. Another remedy that has come into general use of late and said to be effective is to remove the earth from the surface of the roots near the trunk and cut away all the decayed bark of the roots or trunk and wet the affected parts with crude carbolic acid—one part of acid to one of water—and bandage to exclude the air.



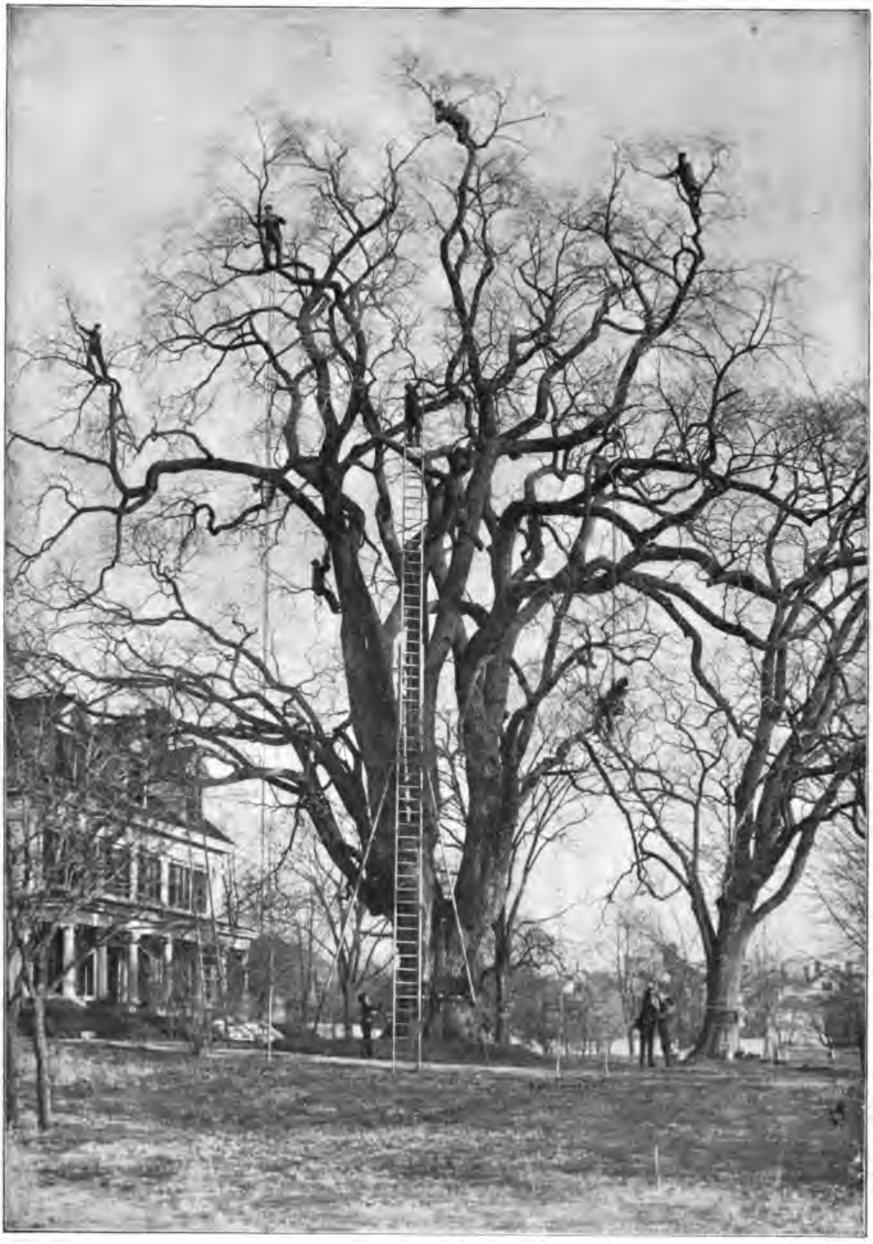
WORKERS DESTROYING MASSES OF GYPSY MOTH EGGS ON ROCKS AND LEDGES, SHOWING COSTLY WORK THAT MUST BE DONE IN BADLY INFESTED FOREST PARKS.

From a photograph taken by the State Board of Agriculture of Massachusetts. From Report of 1897.



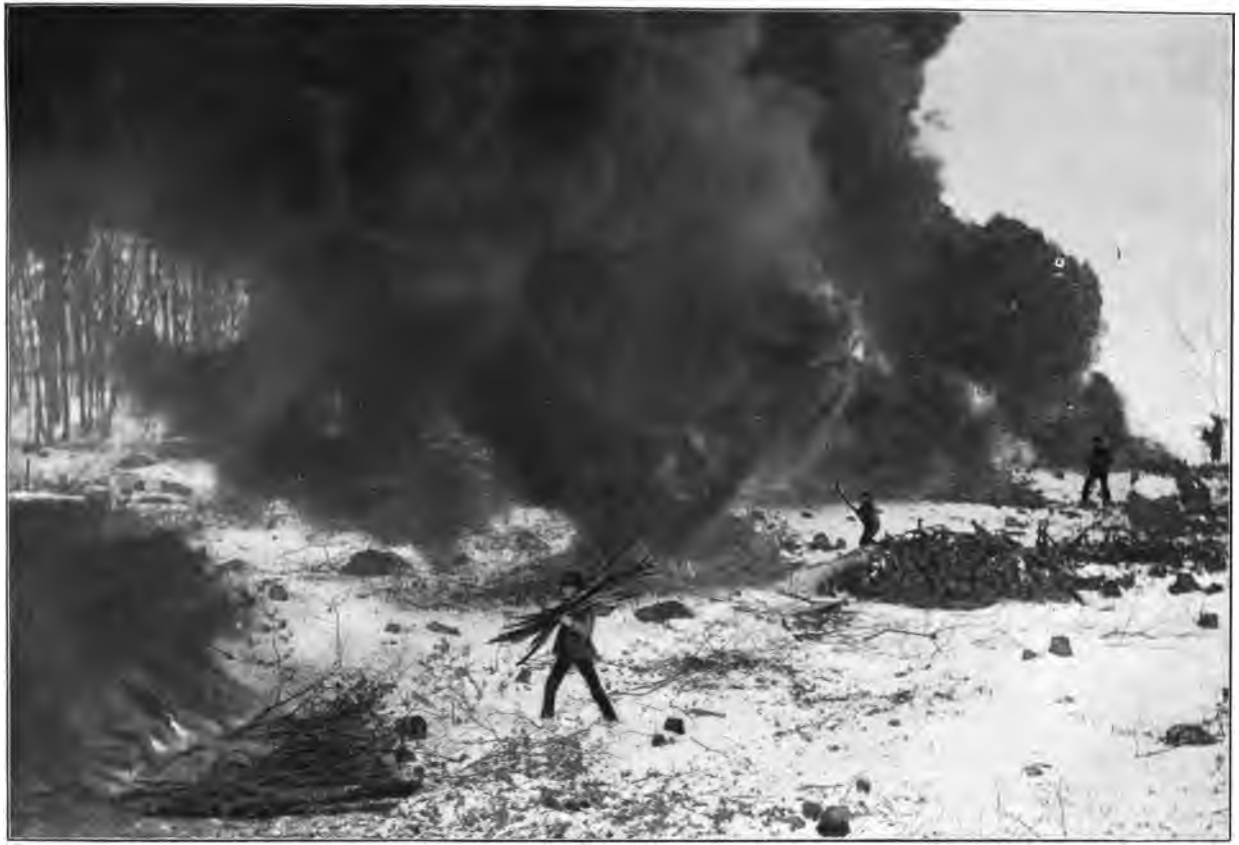
Workers in the Middlesex Reservation, Massachusetts, Destroying the Eggs of the Gypsy Moth. This Illustrates the Expensive Work that Must Be Done in Badly Infested Localities in Forest Parks.

From a photograph taken by the State Board of Agriculture of Massachusetts. Report of 1897.



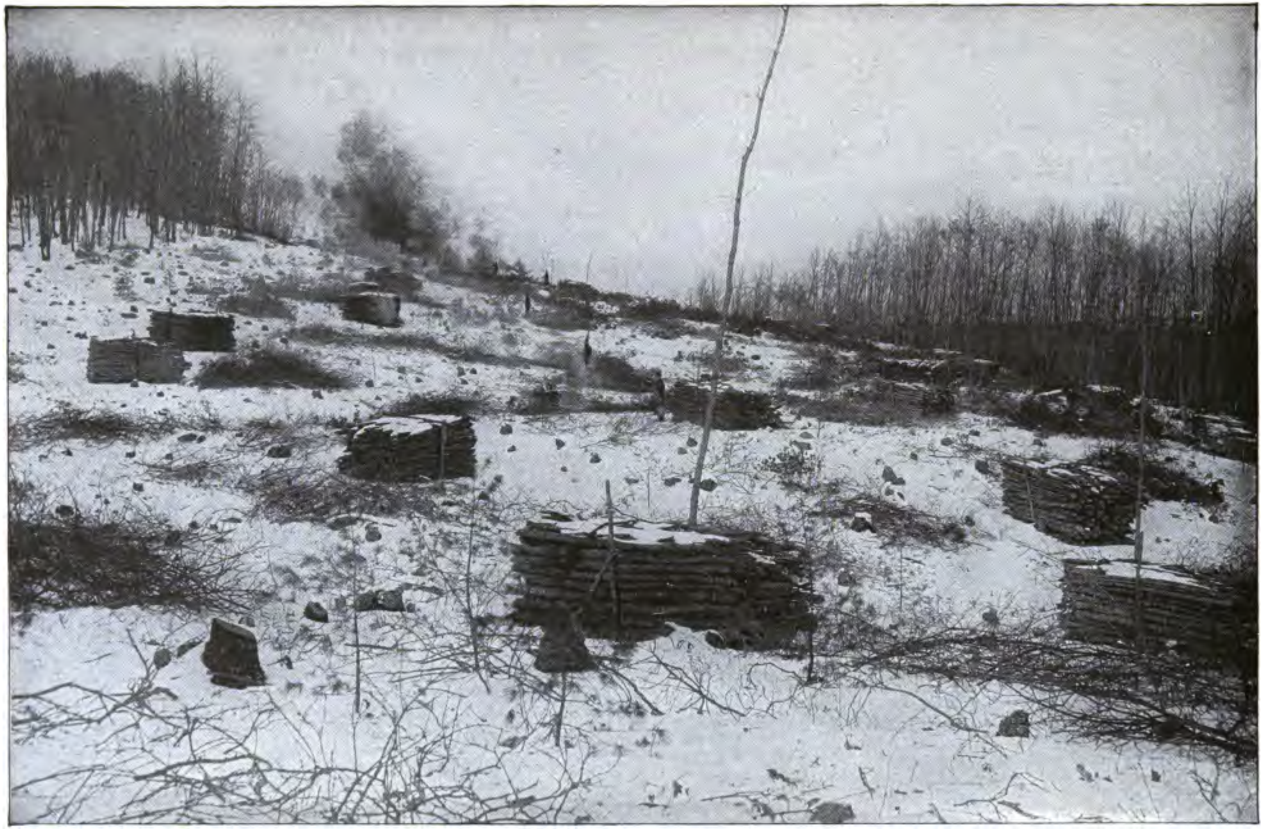
MEN AT WORK ON THE DEXTER ELM AT MALDEN, MASSACHUSETTS, DESTROYING EGG CLUSTERS OF THE GYPSY MOTH.

From a photograph taken by the State Board of Agriculture of Massachusetts for Report of 1896 by Field Agents Forbush and Fernald.

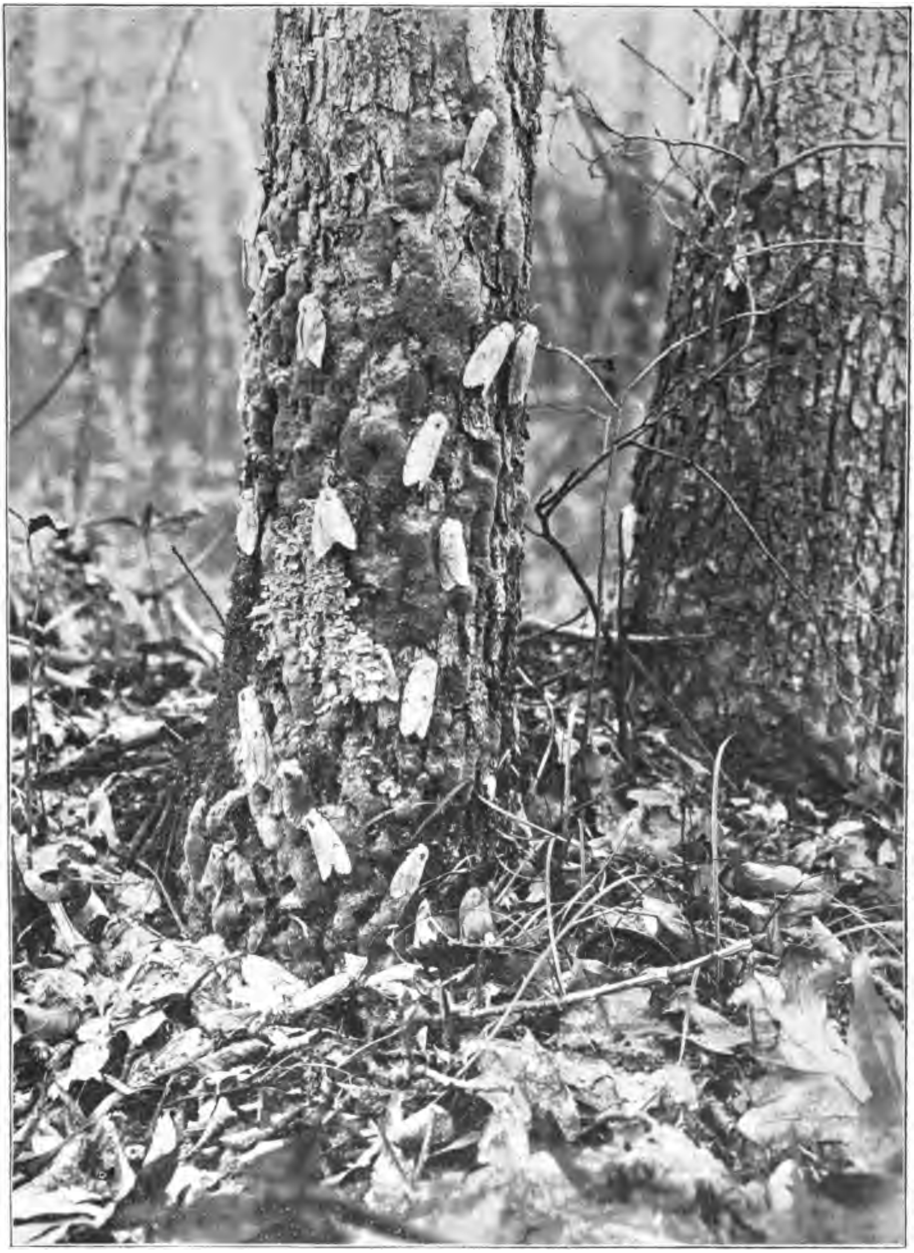


CUTTING AND BURNING INFESTED WOODS, IN AN ENDEAVOR TO EXTERMINATE THE GYPSY MOTH.
STARTING THE FIRES.

From a photograph taken by the State Board of Agriculture of Massachusetts, at Woburn, December, 1894. Report of Field Agents Forbush and Fernald, 1896.

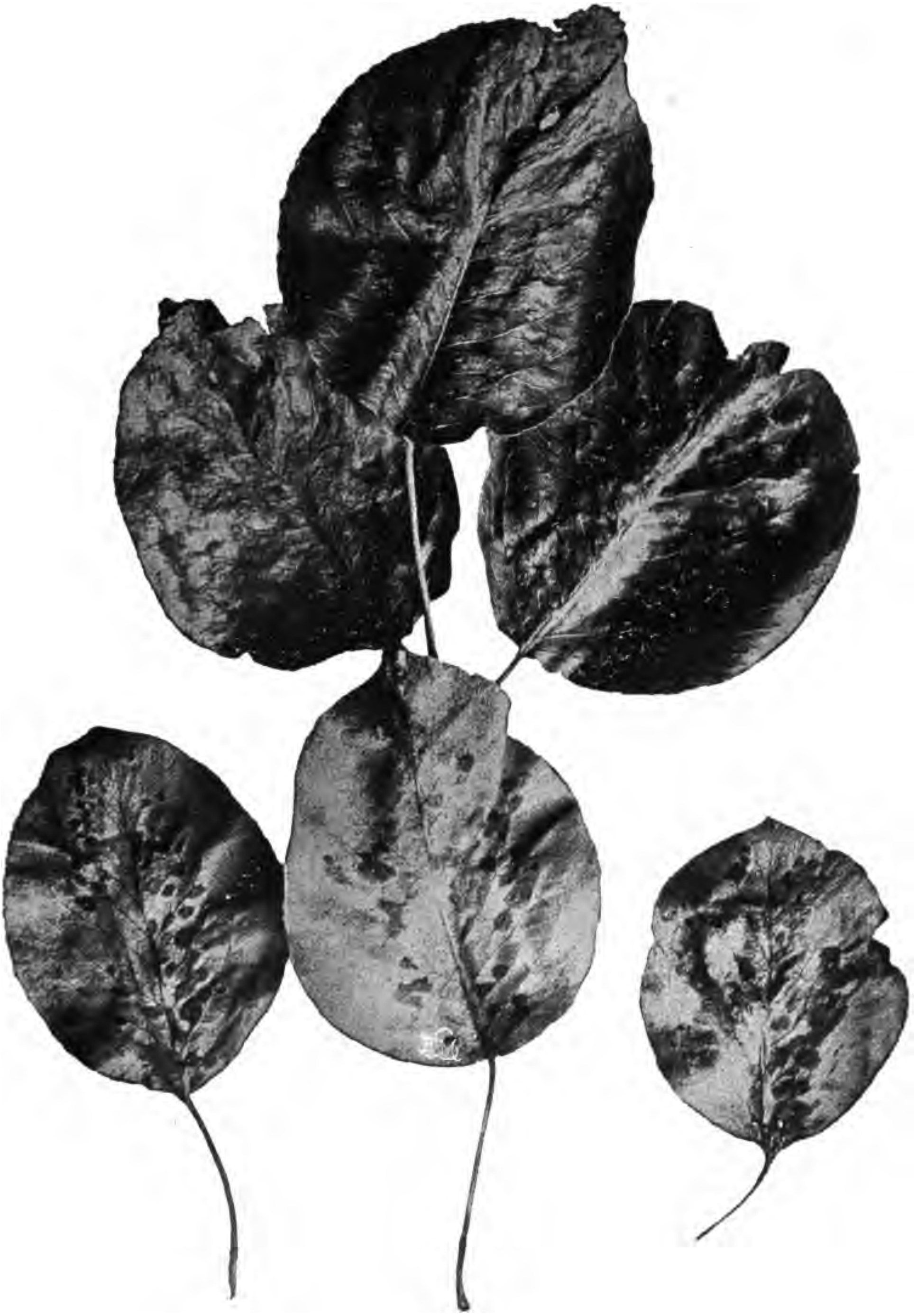


CUTTING AND BURNING WOODS INFESTED WITH THE GYPSY MOTH.
From a photograph taken by the State Board of Agriculture of Massachusetts, in Woburn, in December, 1895.



FEMALE GYPSY MOTHS DEPOSITING THEIR EGG CLUSTERS ON THE TRUNK OF OAK TREES AT SAUGUS, MASS.

From a photograph taken by the State Board of Agriculture of Massachusetts. Report on the Gypsy Moth, by Forbush and Fernald, 1896.



LEAVES AFFECTED BY THE PEAR LEAF BLISTER MITE (*Phytoptus pyri*).
The lower leaves show the gall stage; the upper leaves represent the condition of the leaves after the galls have dried up.
(Reproduced from our Report for 1895–96.)

SULPHURING MACHINE. PLATE XXI.

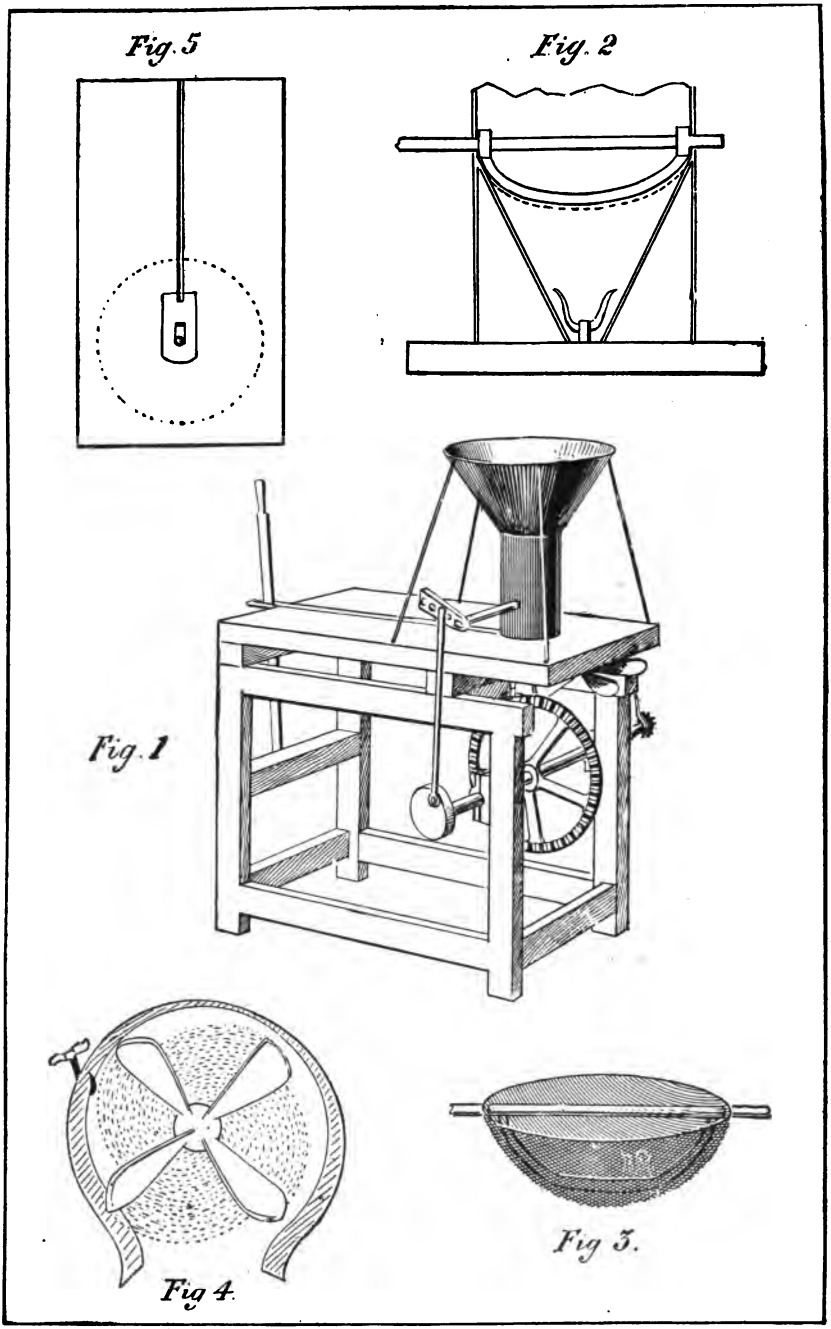


Fig. 1—Machine complete. Fig. 2—Shows position of screen agitator and funnel.
Fig. 3—Screen. Fig. 4—Movable disk to regulate direction of cast.
Fig. 5—Slide to regulate the quantity of sulphur.
(Reproduced from our Report for 1893-94.)

PLATE XXII.

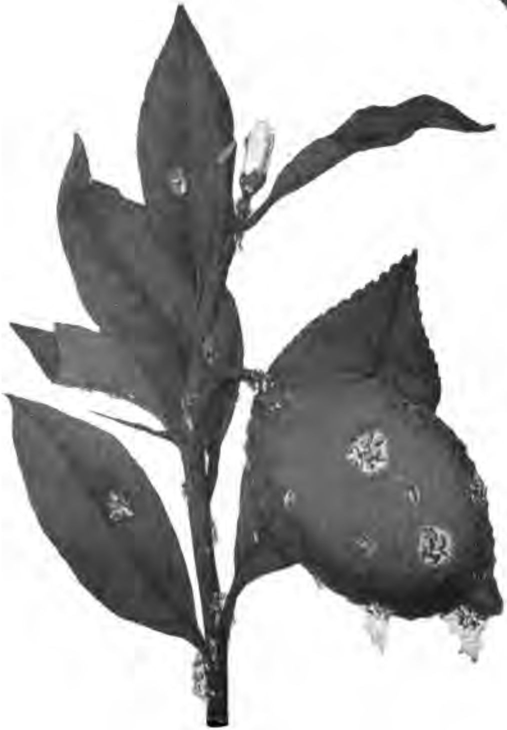


Fig. 1.
Fig. 1—Lemon branch infested by the Mealy Bug (*Dactytopis adonidum*)—Reduced one half.

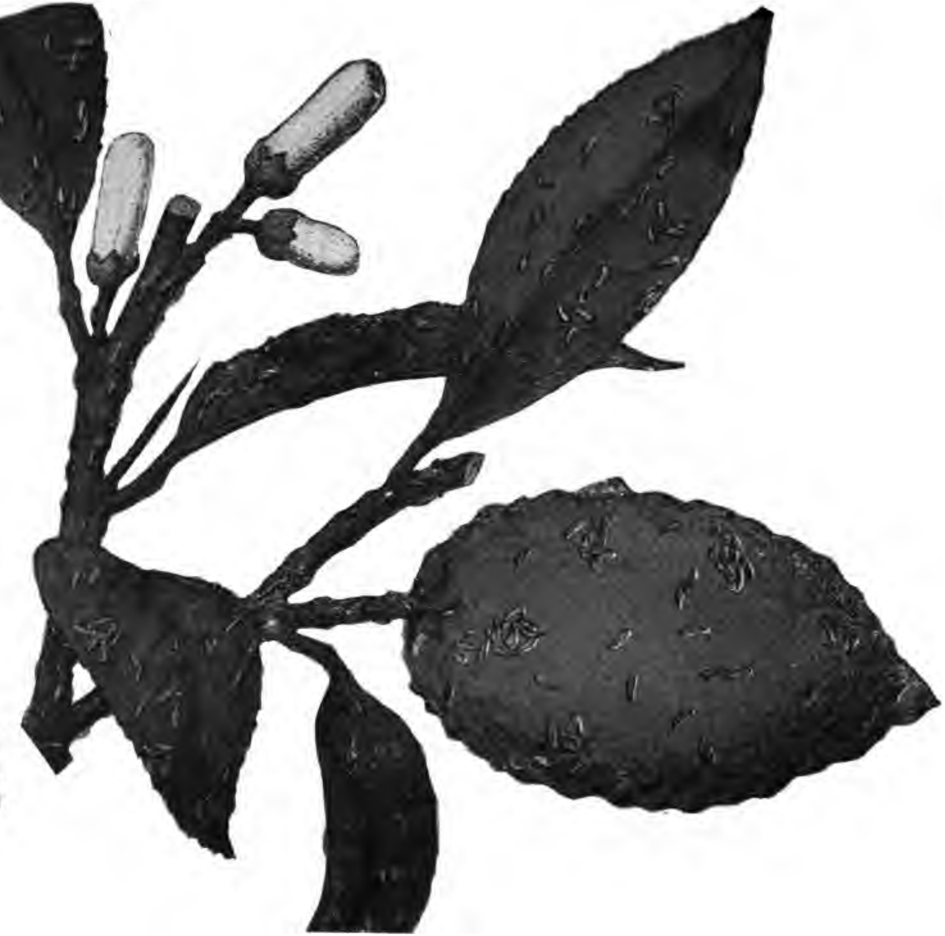


Fig. 2.
Fig. 2—Branch of lemon infested with the Purple Scale (*Mytilaspis citricola*). Natural size.

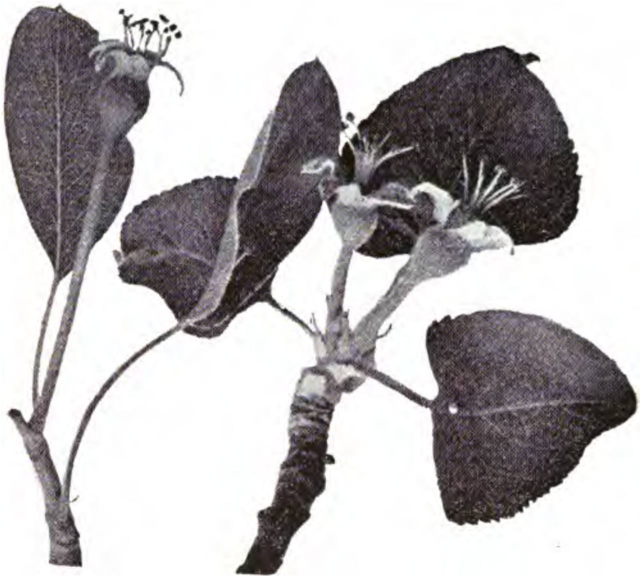


Fig. 1.

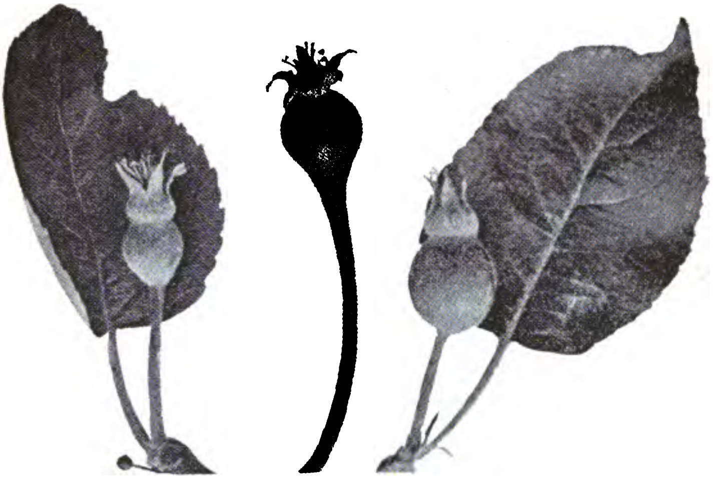


Fig. 2.

DESTRUCTIVE ORCHARD INSECTS.

Fig. 1—Just right to spray. A pear and two apples, from which petals have recently fallen. Note that the calyx lobes are widely spread. After Slingerland.

Fig. 2—Almost too late to spray apples effectively. Note that the calyx lobes are drawn nearly together on the two apples, while on the pear (in the center), the calyx cavity is open. After Slingerland.

THE CODLING MOTH. PLATE XXIV.

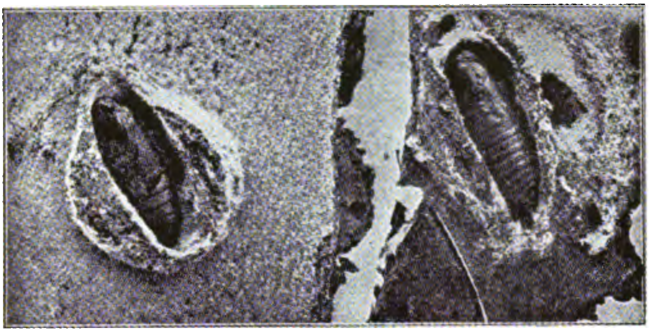


Fig. 1.
Chrysalis of the Codling Moth in cocoons; enlarged.

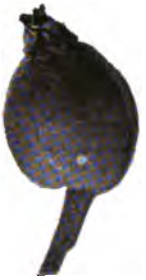


Fig. 2.

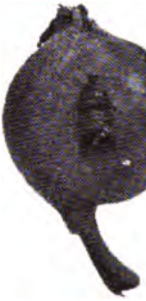


Fig. 3.

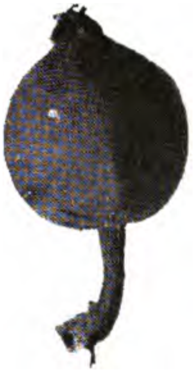


Fig. 4.

Some pictures of the egg of the Codling Moth; natural size. The small whitish spots on the apples (resembling a minute drop of milk) in above figures represent the eggs just as they were laid on the fruit by the moth. After Slingerland.

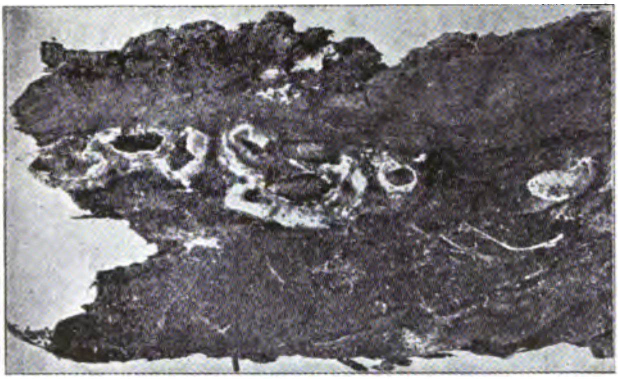
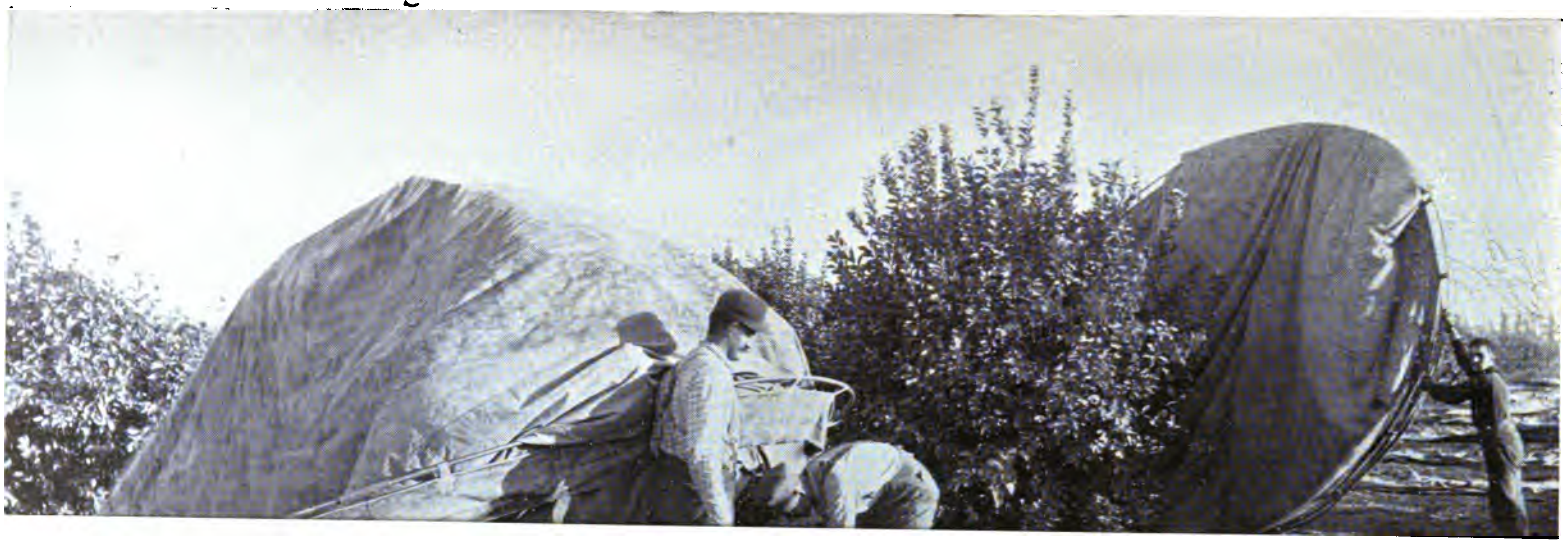
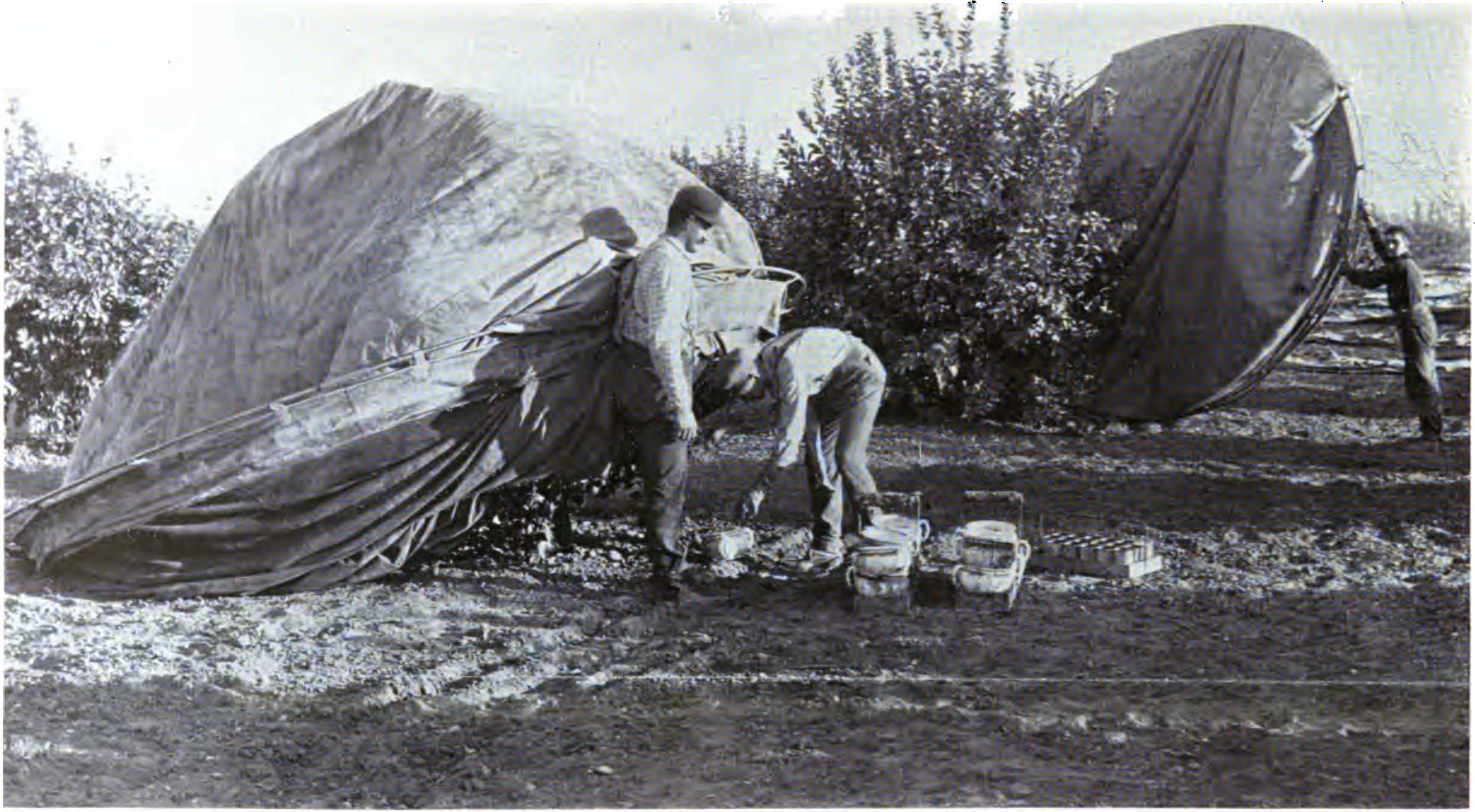


Fig. 5.
Cocoons of the Codling Moth as they were found attached to a piece of loose bark natural size. After Slingerland.

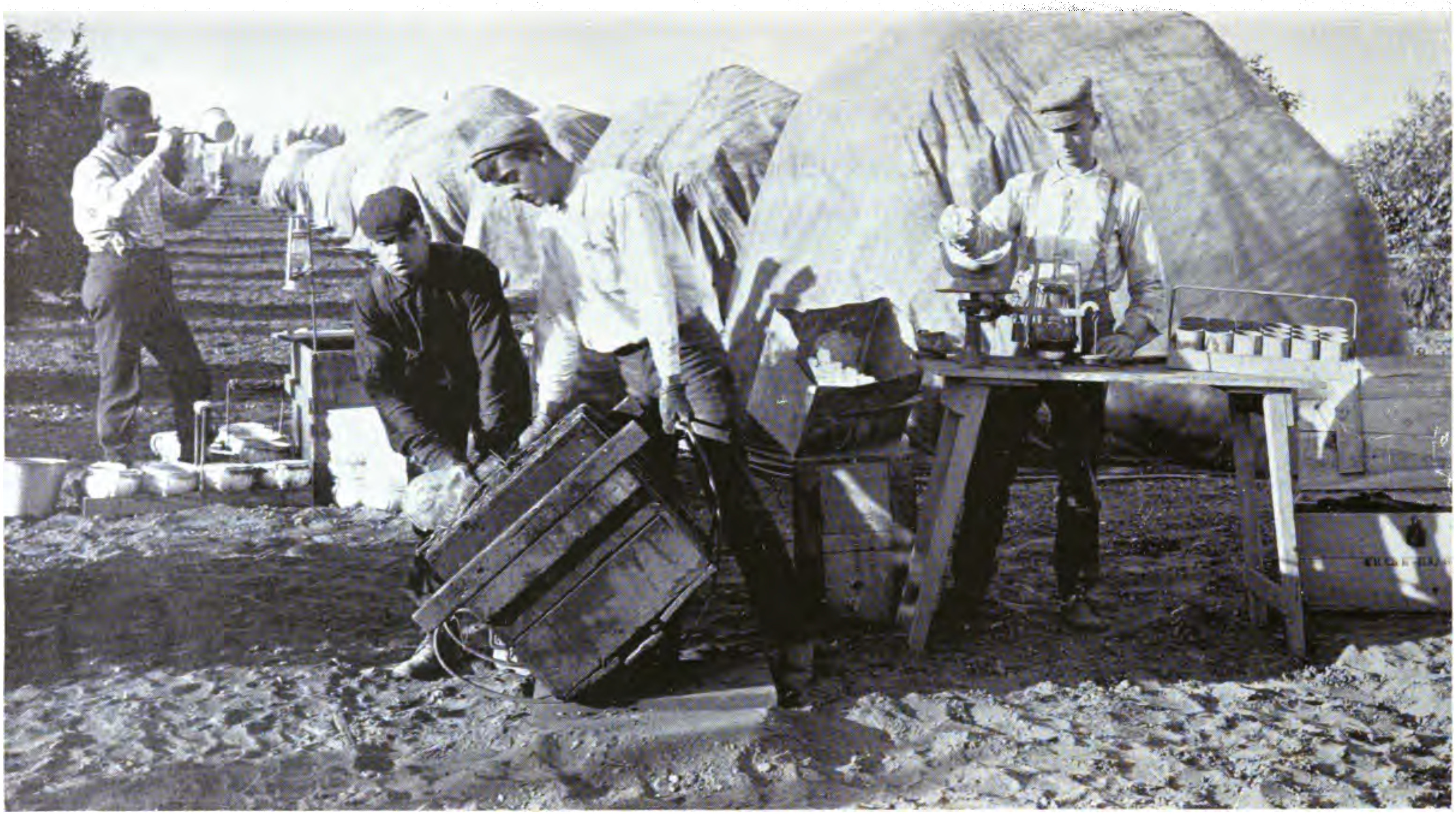
PLATE XXV.



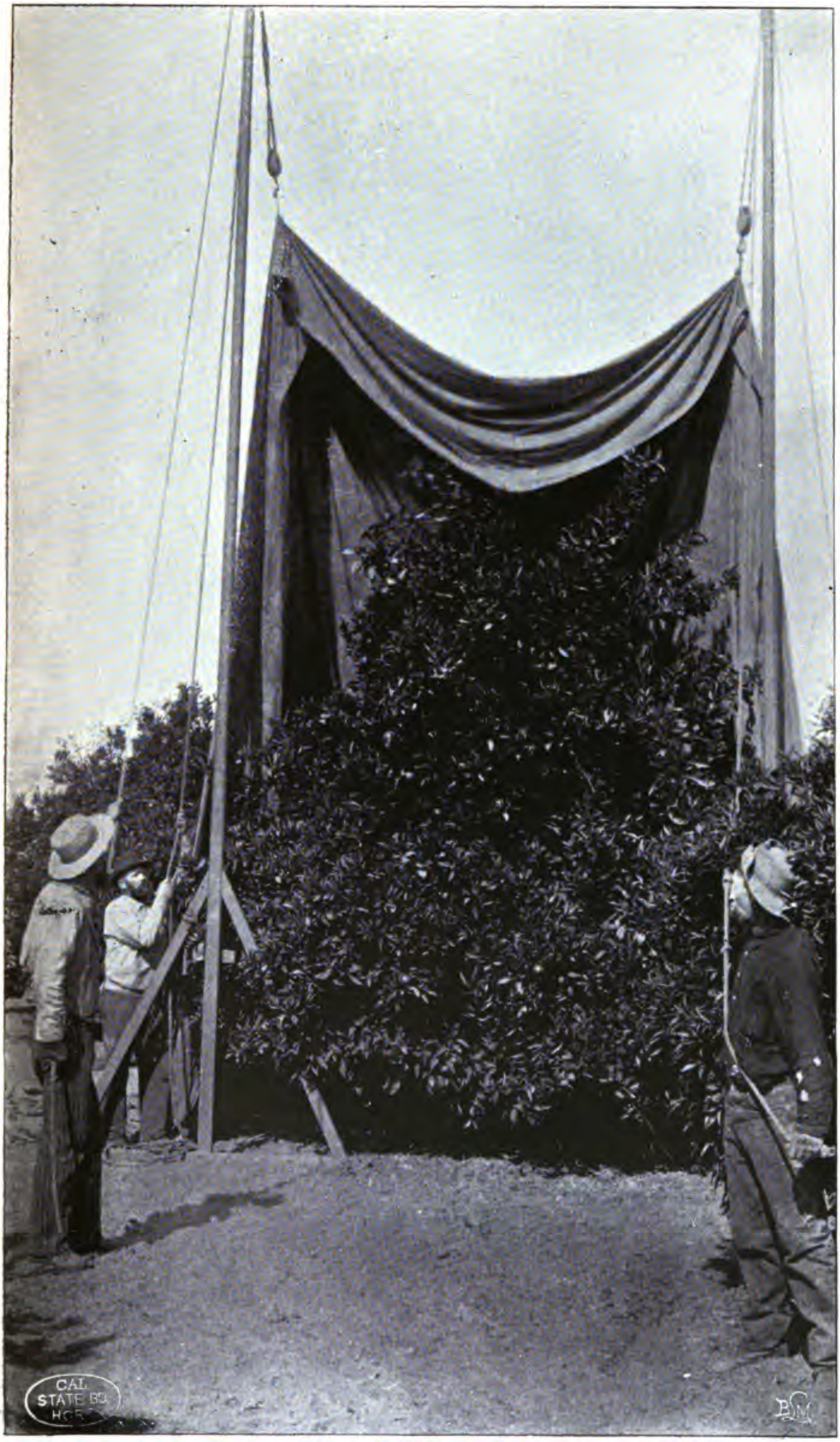
IMPROVED APPARATUS FOR TREATING TREES WITH HYDROCYANIC ACID GAS—"BELL TENT."
View showing row of tents charged with the gas, the men at work charging vessels to treat the next row of trees; materials, etc.



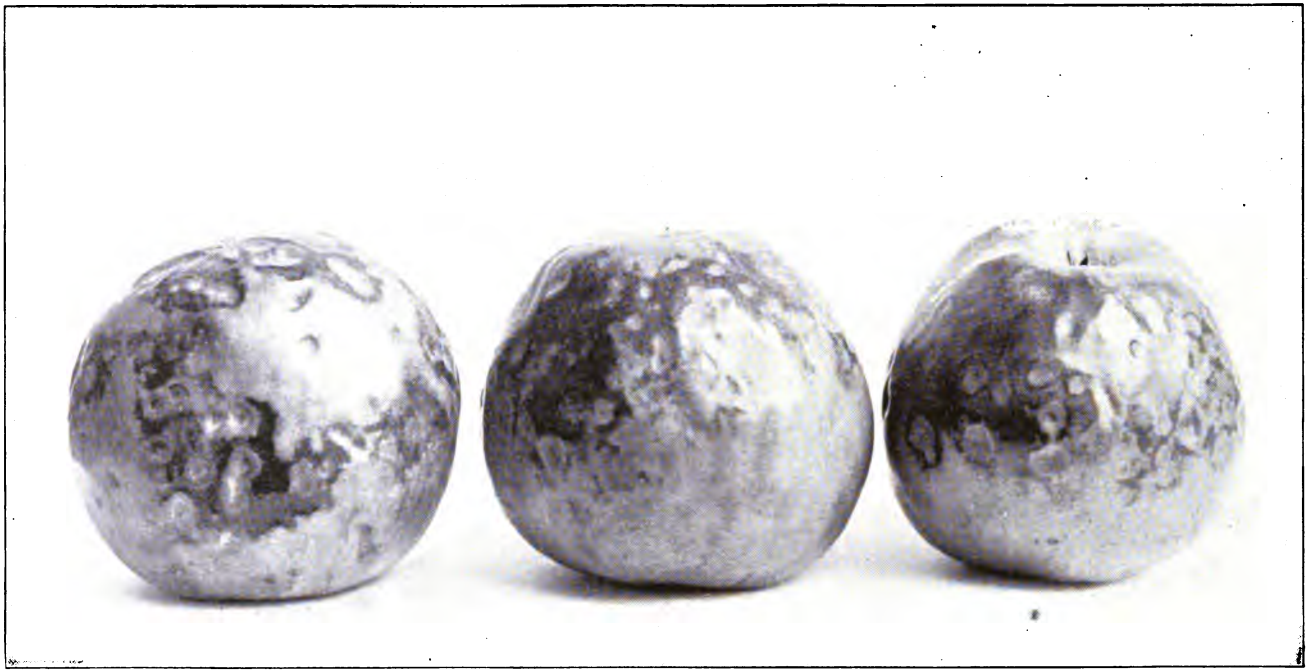
Improved Apparatus for Treating Trees with Hydrocyanic Acid Gas—"Bell Tent."



Improved Apparatus for Treating Trees with Hydrocyanic Acid Gas—"Bell Tent."
View showing row of tents charged with the gas, the men at work charging vessels to treat the next row of trees; materials, etc.



IMPROVED APPARATUS FOR TREATING CITRUS TREES WITH HYDROCYANIC ACID GAS—"SHEET TENT."



APPLES ATTACKED BY THE "APPLE BITTER ROT."
Specimens taken from shipments of apples from the north.

REPORTS

OF

ALEXANDER CRAW,

Quarantine Officer and Entomologist.

ENTOMOLOGY AND QUARANTINE.

REPORTS OF ALEXANDER CRAW,

Quarantine Officer and Entomologist.

To the Honorable the State Board of Horticulture:

GENTLEMEN: I herewith present a summary statement of quarantine work since my last report to you, dated November 25, 1896.

During that time I have found trees and plants upon fifty-eight steamships and sailing vessels that arrived in the port of San Francisco. The imports consisted of 779 large cases and crates, 31 bundles, and 84 small boxes, baskets, and loose lots; also, 378 sacks of pineapple plants for Florida.

During this time there arrived 8,143 boxes of oranges from Japan that showed slight indications of scale. Those I fumigated with extra strength hydrocyanic acid gas. Also, 77 boxes of oranges from Mazatlan, Mexico. In treating one of the lots, I had an experience unlike any I have seen recorded. The rooms in which the fruit was fumigated are gas-tight and dark. In order to see to add the cyanide to the water and acid, I used a lighted candle, and as soon as the gas issued from the generating jar it ignited, and was with difficulty extinguished. As very few are aware of the inflammable nature of this gas, I consider it well to call attention to the fact. Of course, the gas is very deadly, and must not be inhaled.

Ten boxes of oranges from Samoa infested with the orange *Chionaspis* were destroyed; also, six boxes of oranges from San José del Cabo, infested with "Glover's scale."

Of the trees and plants, 1,706 were destroyed, as they were infested with insects not found in the State.

The following is a list of the species, also the variety of trees or plants upon which they were found:

On plum trees from Japan: ***Aspidiotus albopunctatus***, Cockerell.
On cherry, plum, and peach trees from Japan: ***Diaspis amygdali***, Tryon.
On cycas from Japan: ***Diaspis amygdali***, var. ***lanata***.
On plants like grape canes from Mexico: ***Aspidiotus crawii***, Cockerell.
On orchids from Central America: ***Aspidiotus biformis***, Cockerell.
On photenias from Japan: ***Aspidiotus andromelas***, Cockerell.
On cocoanut palms from Acapulco: ***Aspidiotus personatus***, Comstock.
On dogwood from Delaware: ***Aspidiotus ancylus***, Putnam.
On oranges from Samoa: ***Chionaspis citri***, Comstock,

On podocarpus from Japan: ***Mytilaspis pallida***, var. ***maskelli***, Cockerell.
On euonymus from Japan: ***Parlatoria theæ***, var. ***euonymi***, Cockerell.
On cocoanut palms from Acapulco: ***Pseudoparlatoria parlatorioides***, Comstock.
On palms from Mexico: ***Comstockielli sabalis***, var. ***mexicana***, Cockerell.
On broom (cytissus) from Japan: ***Leucaspis japonica***, Cockerell.
On oranges from Japan and China: ***Parlatoria pergandei***, Comstock.
On edgeworthia from Japan: ***Dactylopius edgeworthiæ***, Cockerell.

Of the above species eight were new to science, and none of them are found in this State. A few "bag-worms," caterpillars, and insect eggs were also found and destroyed.

One lot of plum trees from Japan for Vacaville I found infested with that destructive and difficult to destroy scale, *Diaspis amygdali*. It is practically impossible to kill this scale, even with extra strong solutions of the best insecticides, so I burned the trees.

Eleven crates of cherry and plum trees infested with this scale, said to have been dipped three times in whale-oil soap solution in Japan, arrived with the scale still alive upon them, so the trees were destroyed.

I have confiscated three lots of artificial flowers that were inserted in cherry branches to give them a more natural appearance. Upon the larger limbs, where the bark was still fresh, I found a few of this scale alive, so burned them. Such flowers could be used for decorative purposes with pot plants and infest the latter.

On the last steamer from Honolulu I found the "red wax scale," *Ceroplastis rubens*, upon some evergreen "leis" or wreaths, and burned them. No such decorations in future will be allowed to land.

Other States and countries have adopted California's policy of guarding against the introduction of insect pests, and now, as you are aware, the question has been taken up by the horticulturists of the country and a bill has been introduced into the United States Senate, with the object of establishing a system of national horticultural quarantine under the Department of Agriculture.

I desire to call your attention to a most remarkable case of scale parasitism, recorded by Dr. L. O. Howard, United States Entomologist. He received four twigs of arbor vitæ, on which were 80 scales (*Lecanium fletcheri*, Cockerell), from Dr. James Fletcher, Entomologist of the Dominion of Canada. Dr. Howard bred 127 internal parasites from these, and upon examining the 80 scales he found that at least 180 parasites had issued from them. He found six species, but the most important one was *Blastothrix longipennis*, Howard. Of the 127 parasites, 108 were this species. I wrote to Dr. Howard regarding the introduction of this wonderful insect into California, and he very kindly requested Dr. Fletcher to send us colonies. I have received a letter from Dr. Fletcher, dated April 14th, wherein he has promised to send us the parasites in June. As soon as they arrive I will colonize them in several districts upon different *Lecaniums*, and hope to be successful.

The Hon. J. Marsden, Hawaiian Commissioner of Agriculture, called recently, and informed me that one species of ladybirds sent them by Mr. Koebele has taken hold of the "purple scale" on the Islands, and is rapidly cleaning that pest out. Mr. Marsden promised to send us colonies of this ladybird upon his return to Honolulu. Before Mr. Koebele's departure for Central America he also spoke in high terms of this ladybird.

SAN FRANCISCO, CAL., April 24, 1897.

To the Honorable the State Board of Horticulture:

GENTLEMEN: During the summer months importations of trees and plants are usually light, but since my report to you, dated April 24th, a greater number of vessels have been found with plants on board, although the aggregate number of plants was less than during any corresponding period. Eighty-six steamships and sailing vessels came into port with plants from foreign countries. The imports were 87 large cases and crates and 177 small boxes, baskets, and loose lots.

As formerly, all plants or fruit having insects new to the State have been destroyed. The danger to the citrus interests of the State from the introduction of the Mexican "orange worm" (*Trypeta ludens*) increases with the improved transportation facilities of that country. So far as known this pest is confined to the States of Morelos and Puebla, 100 miles south of the City of Mexico, but within the past few years it has been found on oranges from those States in some of the markets of the United States. We may look for its appearance at any time in other orange-growing sections of Mexico. The greatest danger to California is in the use of fruit cars that have been used to haul Mexican oranges and then sent here to move our orange crop. All fruit cars arriving in California should be thoroughly cleaned out and the sweepings burned. Afterwards the cars should be fumigated with bisulphide of carbon, or the floor treated with steam to destroy any chrysalis that might be lodged in the cracks. The larvæ always creep downward and would change to pupæ in the débris on the floor. On this account bisulphide of carbon will be preferable for fumigating purposes to hydrocyanic acid gas. Its heavy penetrating vapor and powerful solvent properties act better upon the inert chrysalis.

When Mr. Albert Koebele left last April for Mexico, on a collecting trip for beneficial insects in that country, for the Hawaiian government, I requested him to look up the "orange worm" and secure preserved specimens for me for identification. He recently returned and informs me that the only States that he is positive the worm exists in are those previously mentioned. He made five visits into Morelos, and on the last visit, about the middle of October, he secured the larvæ. He reports it as a most disgusting pest, a single orange containing sometimes over a dozen maggots and very frequently with no external indication of their presence.

I have taken every precaution to guard against its introduction into the State. The railroad company have expressed their willingness to coöperate with us in every way possible. I have also requested Mr. A. Hoffman, the General Freight and Passenger Agent of the Mexican Central Railway, to notify their shippers not to send any oranges to California, for in the event of their being found infested they would certainly be destroyed. In reply he said: "According to best information at hand there will be no shipments of oranges from the State of Morelos to any point in the United States during this season, as their oranges did not give satisfaction last year." This is encouraging, for the danger of infection will not be so great. I also wrote to Dr. L. O. Howard, of Washington, asking if there was any way in which he could establish a quarantine station or inspector at El Paso. He replied that he could take no steps in the way of establishing a quarantine until we learn whether the quarantine bill is likely to pass Congress at the coming session. The only safeguard I can see against this pest is absolute prohibition of citrus fruits from sections where it is found, otherwise we will soon be confronted with a pest as difficult to fight as the codling moth. A telegram received from Dr. Howard, dated Washington, D. C., October 23, 1897, informs me that peaches in Orizaba, in the State of Vera Cruz, Mexico, are infested with the maggots of *Trypeta fratercules*. This works in the same manner as the other species in the orange, and would be a serious pest should it get a foothold in the peach orchards of the United States.

We have reliable information that a similar pest attacks peaches in Australia, also in South Africa. In the latter country they hardly get enough sound fruit some seasons for home use.

In my last report I referred to an internal parasite of Lecanium scales that had done such remarkable work on *Lecanium fletcheri*, Cockerell, in Ottawa, Canada. Dr. James Fletcher, the Dominion Entomologist, very kindly sent me a box of these beneficial insects early in July, and they came through in good condition. In company with County Horticultural Commissioner A. D. Pryal I liberated them in an apricot orchard near San Leandro, in Alameda County, and I hope they will become established so that they can be distributed throughout the State.

Los Angeles and Alameda County Commissioners have done good work in collecting and distributing colonies of *Rhizobius ventralis* the past summer and this fall.

In September, 1894, I liberated, at your request, a colony of these ladybirds in the extensive Centinela orange grove of Mr. D. Freeman, at Inglewood, in Los Angeles County, and in my report to you, dated November 25, 1896, I called your attention to the great increase and satisfactory work of those beetles in that orchard. To show you that the last crop of oranges shipped by Mr. Freeman was satisfactory, I will quote an item from the commercial column of the Los Angeles "Times" of May 22, 1897. It reads: "Orange shipments from Inglewood are about finished for the season. The crop this season amounted to about forty carloads, which is the best crop ever shipped from there by over twenty-five cars." This was not the result of spraying or fumigation or fertilizing, but to the increased vigor of the trees, due to their freedom from the attacks of black scale.

At Chula Vista, in San Diego County, last August I saw the beneficial results of the ladybird in a number of citrus and olive orchards, notably that of Mr. and Mrs. Herman, in their "Casa de las Flores" place. Three years ago their citrus trees were covered with black scale. They applied to the State Board of Horticulture for a colony, and liberated the beetles in the orchard. Several friends that were very solicitous about their neighbors' welfare, tried to induce them to fumigate, but they steadfastly refused. Upon examination of their trees I found the *Rhizobii* present, but hardly a black scale to be seen and the trees bright and clean. County Commissioners Hall and Austin have distributed colonies the past summer.

At Whittier, in Los Angeles County, the *Rhizobius ventralis* has secured a splendid start in several orchards. This is encouraging, as it shows they are gradually taking hold in numbers more inland. From these orchards the Los Angeles County Commissioners have drawn thair principal supplies. An extensive olive orchard near Hollywood, that was formerly black, was bright and clean when I visited that section in August last. Inspector George Compere collected a great many colonies of *Rhizobius ventralis* from this orchard.

One orchard at Ellwood, that has been bright and clean for three years, showed some slight infection in one corner last spring. The patch was left as a test in order to ascertain if the *Rhizobii* would reach it, of their own accord. During my visit in August my attention was called to the existence of the ladybirds in all stages upon the infested trees, and they were cleaning the trees from scale. This ladybird has bred better in confinement in our breeding jars this season than formerly. There has been hardly a time that we could not find larvæ in all stages, the same as we do *Vedalia* and *Novius*.

I have furnished Dr. L. O. Howard, of the Department of Agriculture, with three strong colonies of *Vedalia cardinalis* and *Novius koebelei* for transmission to Egypt. The Egyptian Government appealed to our Government for assistance in an effort to again check the spread of their cottony cushion scale (*Icerya ægyptiacum*), as it was doing serious damage in that country. In sending the colonies, Dr. Howard stated that they were sent through the courtesy of the State Board of Horticulture of California. On October 4th, Dr. Howard wrote that he had received a letter from the Minister of Agriculture of Portugal, stating that the cottony cushion scale (*Icerya purchasi*) is doing destructive work in portions of Portugal, and requesting him to try and secure for them colonies of beneficial insects. I sent him two lots, securely packed, which he forwarded, giving credit to this board.

The State Board of Horticulture has supplied beneficial insects to Cape Colony, South Africa, Samoa, Hawaiian Islands, Ceylon, Italy, Portugal, Egypt, and British Columbia.

On pages 222 to 227 of the Yearbook of the United States Department of Agriculture, for 1896, appears an account of some of the imported parasitic and predaceous enemies of scale insects in California. The article begins: "In no country in the world has the possibility of control of insects by introducing and fostering their natural enemies been so strongly tested as in California." Then follows an interesting review of what has been done in this line in the past few years. The article is from the pen of Mr. C. L. Marlatt, First Assistant Entomologist United States Department of Agriculture, after his personal investigation of this subject in this State, made under instructions of Dr. L. O. Howard.

On September 30th, the steamship Doric arrived from Japan and had a shipment of fifty tea bushes that were very seriously infested with that destructive scale *Diaspis amygdali*, Tryon. The plants and case were destroyed. This scale must be spreading in that country. Six years ago we only found it slightly upon some double-flowering peach trees. Since then it has been found upon plum, cherry, walnut, persimmon, and Cycus revoluta. This is the first time that it has been recorded upon tea plants. Cabinet specimens were saved. In Ceylon and Jamaica, where this scale is also found, it is a very general feeder. Liquid remedies are worthless against this pest.

During the past six months the following scales have been found that were new to science:

Aspidiotus greenii, Cockerell, on stems of bamboo from Japan. This would be a difficult one to kill owing to its locating in great numbers under the leaf shields encircling the stem, where it is secure from insect enemies or sprays.

Chionaspis latissimus, Cockerell, on *Distylium racemosum* from Japan. This is one of the most distinct species of this genera.

Chionaspis cockerelli, Cooley, on palms from China.

Chionaspis aucubæ, Cooley, on aucubas from Japan.

Chionaspis wistariæ, Cooley, on wistaria from Japan.

Leucaspis japonicus, Cockerell, formerly found upon cytissus, I have found upon maples.

Besides these we have several undetermined species of scale insects, also beetles and caterpillars, found upon imported plants.

When the Chinese embassador arrived on July 12th, one of his attachés had a very pretty split-bamboo cage, containing an unusually large species of katydid. In the cage was a slice of apple for food. He made a strong plea for his pet, but it had to die.

A few years ago the American katydid (*Microcentrum retinervis*) did considerable damage in eating the tips of citrus and other trees, but it is now held in check by the work of a hymenopterous parasite that breeds in the eggs of the katydid. Now it is very rarely seen in California.

From one hundred to nine hundred boxes of limes arrive every week from Acapulco. I am satisfied there is a good opening for growers—in portions of the State where the Mexican lime grows—to plant the Imperial lime budded upon orange stocks. This lime compares favorably with the imported lime, both as to size and acid, and if packed slightly green, the same as the Acapulco fruit, it will keep as well. Mr. A. C. Thomson, of Duarte, Los Angeles County, has two trees of Imperial lime from which he gathered $30 worth of fruit during last summer.

The Los Angeles County Commission sent me a twig from an *Araucaria bidwelli* infested with scale, which I found was *Aspidiotus rossii*. They stated that the tree is over twenty feet high. I instructed them to burn the tree and make a thorough inspection of adjoining trees and plants. We occasionally find palms and other plants from Australia and Samoa infested with this scale, and destroy them.

The steamship Orizaba, running to Mexican ports, now calls alternately at San Pedro and Redondo. I wrote to the Los Angeles Horticultural Commissioners, notifying them of this change, and they have an officer in attendance to see that no plants or fruit are landed.

The Florida "rust mite" or "oil mite" (*Phytoptus oleivorus*) has obtained a foothold in San Diego upon some Florida-grown trees. When this insect attacks lemons, the fruit becomes a light gray, spoiling its appearance. The ravages of the insect can be checked with kerosene emulsion or a liberal supply of dry sulphur dusted over and through the infested trees.

San Francisco, November 11, 1897.

To the Honorable the State Board of Horticulture:

Gentlemen: I herewith present to you a synopsis of the work of my division since my report to you of November 11th, last.

Close attention has been given to the arrival of all trees and plants and fruit entering the State by sea, and as usual the railroad company has kindly furnished us with information upon the arrival of nursery stock by rail from outside of the State. The various county commissioners and inspectors have also been notified by the company when stock arrived in their districts. The great importance of such information can readily be understood. It not only saves the orchards of the purchasers of such nursery stock, but also the neighboring properties and the State from new pests. In doing this the managers of the railroad company also directly benefit themselves. This was clearly shown at the time the *Icerya* pest reduced the shipment of citrus fruits.

We have continued the fumigation of all Japanese oranges that arrive. The season for this fruit is from the second week of November until the second week of February, and is at its height about Christmas time. This season we fumigated 12,461 boxes. The fruit is treated in air-tight rooms and exposed to hydrocyanic acid gas for not less than three hours during the day and the last batch is left in the rooms all night. Their oranges ripen earlier than ours, and this has justified their sending them so far. This season they have lost money, and I doubt if any will be sent here next year, as California is now producing "Tangerine" and "Unshiu" oranges in quantity and of excellent appearance and quality. The Japanese box contains about thirty-five pounds of fruit. The following table will show the expense of placing this fruit upon this market:

	Per Box.
Cost of fruit, box and packing	$0 45
Freight from citrus district to Kobe	03
Per steamship, Kobe to San Francisco	37
United States customs duty	33
Drayage and fumigating, San Francisco	04
Total	$1 22

To this has to be added for each entry or shipment: Consul fee in Kobe, $3 50; brokerage in Japan and San Francisco, $3. This would probably amount to one cent for each box, making $1 23. The trade price for this fruit has been from 85 cents to $1 25 per box, so there was an average loss of 18 cents per box during the season. The fruit has averaged well and reached here in good condition, with the exception of the last shipments, when it was overripe.

The Chinese merchants in San Francisco import from China during their holidays from five hundred to a thousand cases of oranges and pomelos, which we also fumigate. This freight is manifested merchandise, but is withheld at delivery and fumigated. As a rule, this fruit arrives in poor condition, as it is mixed with other freight in the hold of the ship. The large square boxes they pack in are also poorly ventilated, so the fruit sweats, causing it to decay in the close, warm atmosphere.

That serious and difficult to destroy "mining scale" (*Howardia* (*Chionaspis*) *biclavis*) I found upon a few oranges from Colima, Mexico, and destroyed the fruit. This indicates that this destructive scale also attacks the fruit as well as the tree, and that it is established in that State, so I call attention to the fact.

Previous to this season we have allowed pineapples to be delivered, as they were only slightly infested with "mealy bugs" and the fruit was principally consumed in San Francisco. County Horticultural Commissioner George P. Hall, of San Diego, received some of the fruit in his city and called my attention to the fact that the mealy bugs are a troublesome insect in some of their lemon groves. Since then we fumigate all pineapples that arrive as freight, or in the possession of passengers.

Nearly all indoor plants are more or less subject to these insects. A passenger from Japan, per steamship Coptic, November 6th, had a few samples of Japanese apples. Upon examining the fruit I noticed that they had been burrowed into by some small worm. The work was entirely different from the codling moth worm burrows, and resembled more the apples that arrived from Australia in May, 1897. The pest was new to me, so I submitted portions of the apples to Dr. L. O. Howard. In his reply he said: "While I am not certain about the insect which affected the apple, fragments of which you send me, I am much inclined to think that it was the larva of *Laverna herellera*, which has been described by Matsumura in a recent number of the Journal of the Zoölogical Society of Japan. I had an article on this insect, also by Professor Matsumura, ready for publication in bulletin No. 10 of this Division, and had just completed a figure of it from his sketches for my Yearbook article when your specimens arrived. It is a dangerous insect, although since it is single-brooded it is not apt to be so injurious as the codling moth." We are hardly likely to receive apples as freight from Japan, but without increasing trade and travel with that country a strict watch will be necessary to prevent passengers from bringing fruit from there.

Professor A. P. Hayne notified me that he had learned of the existence of a serious vine-root pest (*Margarodes vitis*) in Chilian vineyards. Since then the Hon. J. Abelardo Nunez, Inspector-General of Instruction of the Republic of Chili, called upon me and I learned from him that the *Margarodes* belongs to the soft scales like a "mealy bug," and is a serious and difficult pest to combat, as it lives entirely under ground and poisons the vine by its attack upon the roots, in the same manner as the phylloxera.

Professor H. A. Morgan, of Baton Rouge, Louisiana, has called attention to the existence of a new plum and peach pest that has made its appearance in that State. It is known as the "peach and plum leaf saw-fly" (*Caliroa* (*Selandria*) *obsoletum*). It completely defoliates such trees. "In about two years they kill an orchard effectually."

It is steadily becoming more numerous, until now it may be considered one of the worst enemies of plum and peach trees of that State. I publicly called the attention of our orchardists and nurserymen to this pest, and cautioned them against purchasing such trees in that or adjoining States.

In your Fifth Biennial Report for 1895–96, on page 24, you called the attention of California fruit-growers to the danger of introducing the "bud moth" (*Tmetocera oceliana*) from the Eastern States. The nearest points of infection at that time were Missouri and Idaho. Now, according to Professor A. B. Cordley, of Corvallis, Oregon, it has obtained a foothold near Portland. Not a tree should come into the State without careful inspection and thorough disinfection, so as to prevent the introduction of this and other fruit tree pests.

Everything arriving in the plant line has been carefully examined, and when infested with insects new to the State, has been destroyed. Five scale insects new to science have been found upon trees from China, Japan, and Australia. Cabinet specimens were retained and the trees and plants destroyed. Close inspection has shown new food plants for that serious white scale, from Japan, *Diaspis amygdali* and its variety *lanatus*. This would be a more destructive pest than the "pernicious," or so-called San José, scale (*Aspidiotus perniciosus*), as it cannot be controlled by any other remedy than hydrocyanic acid gas. The General Agent of the Pacific Mail Steamship Company received, per steamship Gaelic, November 27th, three more double-flowering peach and plum trees from Japan. The trees were over twelve feet high, old, and well balanced. This scale was not as plentiful upon those trees as they were on three similar trees he received from the same country a year ago, but like the others, they were destroyed.

On March 13th, the steamship China arrived from the Orient, via Honolulu. A passenger from the latter place brought a package of sweet-potato plants, the leaves of which were tunneled by a lepidopterous miner. The larvæ and chrysalis were present in healthy condition, so the plants were all destroyed.

A lot of ornamental plants arrived on the steamship Orizaba, from Mazatlan, Mexico, for Marin County, that we found were infested with the "fringed scale" (*Asterolecanium fimbriatum*), also the cottony scale (*Orthezia insignis*), and were destroyed. This latter scale is reported as a serious pest in some portions of Mexico on the orange.

The European large titmouse, or Kohlmeisen (*Parus major*), has been discussed in horticultural circles the past season, as a desirable bird to introduce to check the codling moth. Several enterprising growers in Oregon, Washington, and this State had taken steps to bring them here from Germany. I wrote to Dr. Howard to ascertain if they had any information in the Department regarding this bird and as to the advisability of introducing them. In reply he said in part, by quoting from an English publication, showing that those birds spoiled the best part of a very limited crop of apples, even turning their attention to pears and finally destroying his figs. In conclusion he said: "Therefore, until the evidence of the fruit-feeding habits of the Kohlmeisen is thoroughly disposed of, there should be no further agitation of the question of importing this bird. At the present time the experiment would be a dangerous one, even with the evidence strongly preponderating on the right side." Its love for figs would certainly be a serious matter for California. If anything is done at all, it should be to introduce the internal parasites and predaceous insects that are found to prey upon the codling moth in Europe. Such insects can never become a pest themselves.

SAN FRANCISCO, April 12, 1898.

NEW SCALE INSECTS THAT HAVE BEEN QUARANTINED.

By ALEXANDER CRAW, Quarantine Officer and Entomologist.

The following is a partial list of scale insects found upon plants, shrubs, trees, and fruit entering the State since the last published report of this Board. They are all new to California and most of them new to science. Samples of each have been preserved and put up in glass tubes, and now form part of the cabinet collection of scale insects in the office. Our past, and even present, experience with this class of destructive insects makes us suspicious of new importations.

When the other serious scales were first introduced into the State they gave no more indication of the trouble, expense, and destruction they have inflicted upon the horticultural interests of the country than any of those that have been quarantined against and destroyed within the past few years. It is a well-known fact that all scale insects exist at the expense of the plant or tree they infest, and none are in any way beneficial to vegetation, so we make no mistake in keeping them all out.

Aspidiotus andromelas, Cockerell.—This is one of the smallest of this family and very closely related to the destructive *A. perniciosus*, or so-called "San José scale." The male scales are pitch black, without any white or gray dot and ring. It infests photenias from Japan, and belongs to the same group as *A. albopunctatus*, sometimes found upon orange and plum trees from the same country.

Aspidiotus ancylus, Putnam.—This scale was received upon some deciduous ornamental trees at Golden Gate Park from the Eastern

States. This species is somewhat common on pear trees in portions of Colorado. At first glance it resembles the pernicious scale. The margin of the scale is light gray, with a light-colored exuviæ located slightly to one side of the center. This portion of the scale is covered with a film that gives it a white appearance; the film frequently splits, leaving exposed the exuviæ, which is reddish brown; the balance of the scale is dark gray, almost black.

Aspidiotus bambusarum, Cockerell.—This scale was found infesting bamboo plants received from Japan, and closely resembles the large, dark *Aspidiotus duplex* class, found upon orange trees and other plants from the same country, and referred to on pages 33 and 34 of the Report of 1895–96. "The female scale is very dark brown, almost black, tolerably convex, dull; exuviæ between the center and the side; first skin exposed, light orange; second, large, brown, covered. A well-formed ventral scale."

Aspidiotus biformis, Cockerell.—A circular, dark-brown scale found upon orchids from Central America. Near to the "Florida red scale" (*Aspidiotus ficus*) and "Ross scale" (*Aspidiotus rossii*).

Aspidiotus crawii, Cockerell.—This scale was found upon cuttings of what was said to be sarsaparilla from Mazatlan, Mexico, but they had more the appearance of grapevines. It looks like the "greedy scale," *A. rapax* and *A. cydoniæ*, but has not the dark exuviæ of the former. "Scale moderately convex, dull, reddish gray, rather pale; exuviæ nearly marginal, concolorous, inconspicuous, except the first skin, which is marked by a little shining, yellowish prominence. Scales largely covered by the red-brown epidermis. Removed from the twigs, they leave a conspicuous white mark."

Aspidiotus destructor, Sign.—A small, flat, light scale, with yellowish exuviæ, on palm trees from the South Sea Islands. This species is said to be killing out the cocoanut palms in the Marquesas Islands. It is also said to attack dates on the Island of Bourbon in the Indian Ocean.

Aspidiotus cyanophylli, Signoret.—This scale was found upon a bunch of fresh cocoanuts from Mazatlan, Mexico. The scale is oblong-oval, sometimes one-sided, especially when located near a rib, or vein; light colored, with yellowish exuviæ.

Aspidiotus persearum, Cockerell.—A small, circular, drab scale, with a prominent lighter-colored exuviæ, slightly to one side of the center. Infesting the leaves of "Alligator pears" (*Persia gratissima*) from Honolulu, Hawaiian Islands.

Aspidiotus personatus, Comstock.—The female scale of this species is very distinct from any other *Aspidiotus* that I have found. It is very convex, the exuviæ central and shining black, with a white dot in the center, and a concentric ring of the same color; the balance of the scale is black with a yellowish-gray edge. Professor Comstock records this species as infesting the leaves of various trees and shrubs in Havana, Cuba; and Professor Cockerell, who formerly lived in the West Indies, states that it attacks the olive trees there. In this case it was found upon cocoanut palms from Acapulco, Mexico.

Aspidiotus scutiformis, Cockerell.—This is a very conspicuous scale, found on some citrus fruit from Central America. The female scale is dark, and resembles *A. rossii*, but has a large yellowish center, or exuviæ, and unlike most scales this is depressed instead of being convex. In "Technical Series No. 4, Bulletin of the Division of Entomology, Department of Agriculture, Washington, D. C.," Professor Townsend reports this scale "abundant on leaves of orange in Victoria and Monterey (Mexico); also on leaves of pomegranate in Monterey. In the latter place it was especially bad on almost all of the orange trees in all the plazas of the city—the fruit and leaves being simply massed with it."

Aspidiotus secretus, Cockerell.—This scale is well named, for it keeps well out of sight, living crowded under the epidermis and on the stems beneath the amplexicaul leaves of bamboo from Japan. "Female scale is white, shiny; exuviæ exposed, shiny, rather large, very pale yellow, placed rather to one side."

Aspidiotus simillimus, Cockerell.—A delicate looking, small white circular scale infesting palms received from Sydney, Australia. The leaves were all cut off, but near the base some of the leaf stalks were thickly infested with this scale. Some of our more serious scale pests are natives of that country. "The scale of this insect resembles that of *A. destructor* and *A. transparens*. The female differs at once from *destructor* by the longer median lobes; from *transparens* it differs by the more numerous glands in the circumgenital groups, and especially in the much longer squams beyond the third lobe."

Asterolecanium oncidii, Cockerell.—This is a very pretty little greenish-yellow scale, with a fringe of reddish spines. It has been found upon orchids from Central America and from Samoa. In the last report of this Board, three other species of this genus are recorded—one was found upon oleander from Honolulu, one on oak from Rochester, New York, and another upon a climbing plant from Mexico. *A. pustulans*, found on oleander from Honolulu, is reported to be very injurious to fig trees in Bravard County, Florida.

Aulacaspis bromeliæ, Kerner.—This is the scale that is so destructive to pineapples in hot-houses in Europe, and undoubtedly was introduced there upon these plants. We have found pineapples, also the plants, infested with this scale from Tahiti. Pineapple plants and pineapples from Honolulu are frequently found infested with this scale. Female scale is circular, with the exuviæ nearly marginal. The scale is white, the exuviæ light yellow. The first larval skin is usually naked; the second, covered with a delicate film.

Chionaspis aucubæ, Cooley.—This is one of the "Snow scales" found upon aucuba from Japan. The scales are grouped on the under side of the leaf; the edges of the leaf are folded under, almost completely hiding them from view. "The scale of the female is strongly broadened posteriorily and abruptly rounded at the extremity. It is moderately convex, about 3 mm. in length and 2 mm. in width. The exuviæ at the apex of the scale have the first skin very pale yellow, and the second yellowish or brownish. The second skin is covered with a slight secretion. The scale itself is white and very thick and strong. There is a partial ventral scale at the anterior end."

Chionaspis cockerelli, Cooley.—This scale was found upon a palm, also upon two other occasions upon *Magnolia pumila*, and on *M. fuscata* trees from China, and was named in honor of Professor Cockerell by Professor R. A. Cooley, of Amherst, Massachusetts, an authority upon this genus of coccidæ. "The scale of the female is about 3.2 mm. long, straight, or very slightly curved, moderately thick in texture, slightly convex, white, with the exuviæ pale yellowish-brown, the second skin being covered with secretion. Scale of the male, length 1.2 mm., feebly carinated, white, with the larval skin almost colorless."

Chionaspis latissima, Cockerell.—This is a very pretty form of "Snow scale" and differs from the usual pyriform character of this family. They were found upon evergreen shrubs (*Distylium racemosum*) from Japan. A species of the group of *Chionaspis chuensis*, Cockerell, and is shown on Plate VII, Fig. 3, and described on page 37 of the Fifth Biennial Report of this Board. "The female scale is quite circular, white, semi-transparent, with light ochreous exuviæ. The eggs are shining, pale pink."

Chionaspis minor, Maskell.—A small "Snow scale" found upon an ornamental plant from Panama. Mr. Cooley records this species as attacking a number of trees and plants, including grapevines. It was originally described from New Zealand, and is quite generally distributed in the West Indies. It has gained a foothold at Braidentown, Florida, where it is stated to be killing the "China trees" on the main streets of that town.

Chionaspis wistariæ, Cooley.—This new species is named *wistariæ*, because it reached us on, and is therefore described from, specimens found on this beautiful Japanese climbing plant, although I very much doubt if it is peculiar to or even common on such plants in Japan, for we have only found it upon one shipment of plants. "The female scale is about 2 mm. in length, though some specimens are slightly longer, moderately broadened, dirty-white in color, and delicate in texture, being a close imitation of the epidermis of the bark on which it rests. The scales usually occur in the longitudinal cracks of the bark and are partially concealed under the epidermis. They are often pressed out of the normal form. The exuviæ are brownish, and the second skin is covered with secretion. The male scale, as in all other species of this genus, is elongate in form and white in color. The sides are nearly parallel and it is distinctly tri-carinated. Length about 1 mm. The larval skin resembles the anterior or smaller one of the female scale."

Comstockiella sabalis var. *mexicana*, Cockerell.—This is a distinct variety of the palmetto scale (*Comstockiella* (*Aspidiotus*) *sabalis*, Comstock). The typical, and in fact the only, species of this genus, is found only in Florida, so the discovery of this variety upon palm trees received from Mexico marks a new locality and a new variety. The infested trees were collected, where they were growing wild, about seventy-five to one hundred miles inland from Mazatlan, Mexico. Professor Cockerell gives the following description of *mexicana*, by which it can be distinguished from the Florida species: "Female, oval, orange; grouped ventral glands as follows: Caudalaterals, 14 to 17; mediolaterals, 11 to 15; cephalolaterals, 7 to 10. In the typical form from Florida the numbers are 6 to 10, 4 to 7, and 4. Scale like the type." This would probably prove to be a pest upon the great variety of palms that have been planted in this State, if it should, unfortunately, get a foothold.

Dactylopius edgeworthiæ, Cockerell.—This "mealy bug" was found upon *Edgeworthia papyrifera* from Japan. Female with seven-jointed antennæ; legs like those of *Phenococcus*; no distinct cottony appendages. "Female about or hardly 2 mm. long; pale gray, with light brown legs and antennæ. Form oval; back so thickly dusted with white meal as to appear white, with a grayish tint; no distinct lateral or caudal appendages; extremely short, hardly noticeable, thick caudal tufts. The white secretion on the back forms three, more or less, longitudinal rows or small protuberances, giving the insect an obscurely tri-carinate appearance. Immature females similar, but not so mealy."

Diaspis crawii, Cockerell.—This is a larger species than the destructive *Diaspis amygdali*, which it is practically impossible to destroy, and was found upon plants from China. "It has much paler exuviæ than *amygdali*, the median lobes are smaller and farther apart." "The female scale nearly 3 mm. diameter, circular, slightly convex, white; exuviæ subcentral to sublateral, rather large, but inconspicuous, being of a very pale ochreous color. From one quarter to one half of first skin overlapping second."

Leucaspis japonicus, Cockerell.—This is a very small scale, and in general external appearance looks like a small *Mytilaspis* with the female scale like a small, narrow *Chionaspis*. The last abdominal segment of the female is fringed with a series of blunt, spiny hairs. The first plants on which I found this scale were small "brooms" from Japan. Since then it has come on *Magnolia souliana* and maples (*Acer*) from the same country.

Mytilaspis pallida, var. *maskelli*, Cockerell.—A small, light scale, found upon variegated podocarpus from Japan. It resembles slightly the "long scale" (*M. gloverii*), that is such a serious pest on citrus trees.

Parlatoria theæ, var. *euonymi*, Cockerell.—A very small scale belonging to the same family as the "chaff scale," that is so injurious to orange trees in Florida. It was found infesting euonymus plants from Japan. "Female scale circular to oval, dark brown; exuviæ greenish black; second skin circular, with an extremely narrow but well-defined ochreous margin, hardly projecting beyond scale; first scale only slightly projecting beyond second. The scales removed from the twig leave an obscure whitish mark." Its size and color make this scale very difficult to detect.

Parlatoria proteus, Curtis.—It has been supposed that *P. pergandei*, the "chaff scale," was indigenous to Florida. It is now conceded by competent authority that it is identical with *proteus*. The following facts may prove that, after all, *pergandei* is of Oriental origin and was introduced into Florida upon trees or plants, and in searching for its parasites and natural enemies, China and Japan will have to be taken into consideration as available countries to visit. During the past two winters several shipments of oranges and pomelos have been received from the former country that were slightly infested with *P. proteus*. A few scattering specimens of the same scale were also found upon "Unshiu" oranges from Japan, that had evidence of having been attacked by hymenopterous parasites.

Parlatoria zizyphus, Lucus.—Oranges and lemons entering the Eastern States from Mediterranean ports are frequently found infested with this scale. We have found it upon pomelos and oranges from China, and that country may possibly be the native home of that pest. It resembles somewhat the "date palm scale" (*Parlatoria victrix*, Cockerell), but is darker. The scale of the female is long and very black. The first skin is oval and of medium size; the second skin is quadrangular, elongate, and very large. On the middle line there is usually a longitudinal depression, in the center of which there is a ridge. That part of the scale that extends beyond the caudal end of the second skin is brownish white.

Pseudoparlatoria parlatorioides, Comstock.—This scale was found upon palm trees from Acapulco, Mexico. It was formerly described from Florida by Professor Comstock as an *Aspidiotus*, but he had doubts about placing it in that genus. Since then, Professor Cockerell has studied this scale and found structural characters that justified him in erecting a new genera for it with *parlatorioides* as the type species. The color of the scale is light yellow; the exuviæ of the scale are the same color and located at one margin, nearly reaching the center of the scale, giving it very much the appearance of a *Parlatoria*.

TWO DISTINCT FORMS OF "COTTONY CUSHION SCALE."

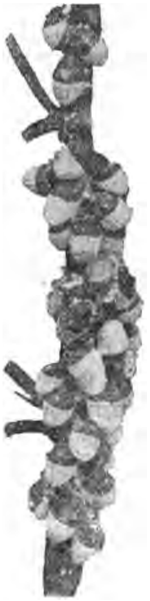


FIG. 37.

The fact that there are two forms of the famous Australian *Icerya purchasi* in California has not generally been noticed. When I first observed this, I was inclined to attribute it to the food plant and local conditions. Since then, however, I have found both varieties in the same districts and upon the same class of trees, and in every case the peculiar characters of each have been constant and well defined. In Los Angeles and other southern counties, where the "cottony cushion scale" was so destructive, only one form was believed to occur in the State. At the time the two large glass houses were erected by the State Board of Horticulture at San Gabriel, for wintering and propagating the Australian ladybirds (*Vedalia cardinalis*) only *Icerya purchasi* were to be found, and the source of infection could be traced to three centers: one was an orchard at Santa Barbara, and the others were at Los Angeles and San Gabriel. In the two former places the infested trees were purchased in the central counties—probably San Mateo, where this insect was first introduced into the State. The white-bodied type of *Icerya*, as well as what was considered to be the true *purchasi*, was found in all the central counties.

Two large cases of branches infested with the white-bodied variety were cut at Lodi, San Joaquin County, and forwarded to stock the *Vedalia* houses at San Gabriel, and the scale retained its characters there. The distinguishing feature of the two forms is very clearly illustrated in Figs. 37 and 38.

Prof. Theo. D. A. Cockerell, to whom I referred both scales for his opinion, gives the following technical description, together with variety names:

(1) *Icerya purchasi*, var. *maskelli*, Cockerell.—"Female (after forming ovisac) slate gray or very dark purplish gray, sometimes brownish in the middle, with marginal dull orange spots. Back little covered by

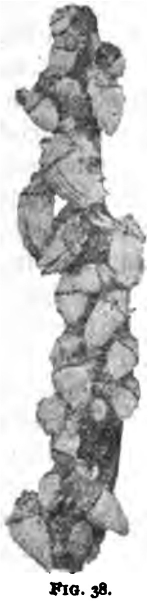


FIG. 38.

secretion. More hairy at the cephalic end than the next. Ovisac not so large as in the next, tinged with yellow just behind the body of the insect. It is *purchasi* in the strict sense, and agrees very nearly, though not entirely, with Maskell's description."

(2) *Icerya purchasi*, var. *crawii*, Cockerell.—"Female (after forming ovisac) light pinkish or yellowish red; the margin orange, with bunches of short, black bristles; the back is largely covered with yellowish-white secretion; ovisac somewhat larger and longer than *maskelli;* femora decidedly more slender."

The *Vedalia cardinalis*, *Novius koebelei*, and the small internal dipterous parasite, *Lestophonus iceryæ*, prey equally well upon both varieties.

METHODS OF PRESERVING SCALE INSECTS FOR CABINET SPECIMENS.

By Alexander Craw, Quarantine Officer and Entomologist.

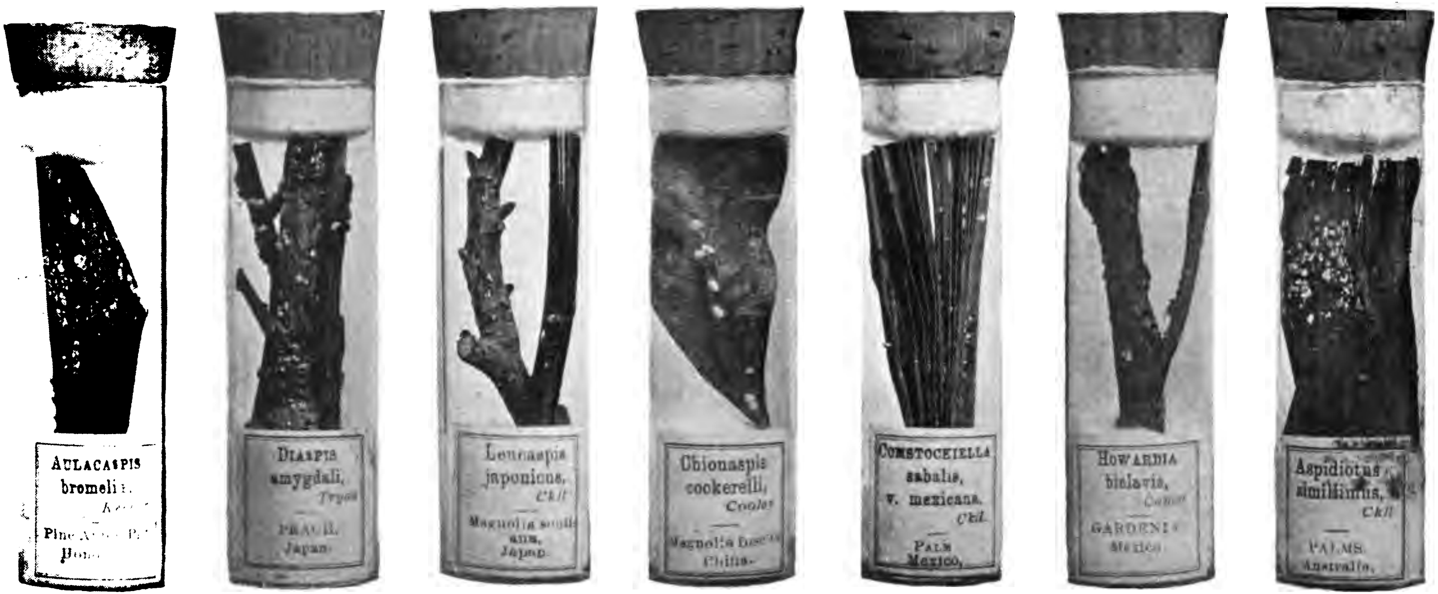
A collection of beetles, moths, and butterflies can be made an interesting and beautiful exhibit, even to people that have no knowledge or special interest in entomology, and they will spend hours in admiring the lovely hues of their wings without ever thinking of the damage the larvæ had done before reaching that stage.

Such a small speck of insect life as the destructive "pernicious" or so-called "San José scale," or the equally serious "red" and "purple" scales, would be passed unnoticed by the general public, but to the fruit-grower they are of vastly greater importance than the more gorgeously-colored and higher developed upper "four hundred" of the insect world. Handling and exposure soon play havoc with a collection of scale insects.

In 1880 and subsequent years, the present officers of this Board—before their connection with it—made exhibits in glass vials of beneficial and injurious insects at horticultural and agricultural exhibitions, and were awarded medals. The scale insects were placed in vials dry, and others were in alcohol. The present method is to place a little naphtholine flakes, or camphor, in the bottom of the vial, covered with a little cotton; this prevents injury to the specimens by cabinet mites. The cork or stopper is pressed in, together with a little absorbent cotton, and the latter trimmed off with the edge of the vial, making a neat finish. Before placing the infested twigs in the vial, they are subjected to the fumes of C. P. cyanide of potassium for a few hours, or are fumigated with hydrocyanic acid gas and then placed between blotting paper, without pressure, until all moisture has evaporated. The specimen is then placed in the vial as near as possible to the glass, so that it can be readily examined with a lens without having to remove it. The specimen is cut long enough so that the cotton on the cork touches it, and this holds it in position, pre-

INJURIOUS FOREIGN FRUIT PESTS.

PLATE XXIX.


AULACASPIS bromeliæ.
Pine Apple
DIASPIS amygdali, Tryon
PEACH. Japan.
Leucaspis japonicus, Ckll
Magnolia soulieans, Japan.
Chionaspis cockerelli, Cooley
Magnolia fuscata China.
COMSTOCKIELLA sabalis, v. mexicana. Ckll.
PALM Mexico.
HOWARDIA biclavis, Comst.
GARDENIA Mexico.
Aspidiotus simillimus, Ckll
PALMS. Australia.

[Specimens of Injurious Foreign Scale Insect Pests, Representing Shipments of Trees, Plants, Etc., Quarantined at San Francisco; also Showing Method of Preserving Same for the Cabinet.

venting it from shaking about in the vial and injuring it. The name of the scale, together with the name of the food plant and habitat of the insect, are printed upon neat labels and gummed to the base of the vial. This record is of importance, as it may be the means of determining where to search for the natural enemies of a species of scale insect. For instance, it was generally supposed that the Florida "chaff scale" was indigenous to that State, and that its near relative, *Parlatoria zizyphus*, was European, but we have them both from China and I am inclined to believe the latter country is their home.

Plate XXIX gives a very good idea of how the vials look. They are one inch wide by three inches long and should be of the best quality as to strength and clearness of glass. Straight sides, *i. e.*, without a contracted neck, are preferable, as they admit the specimen without injury.

OUR NEW POSSESSIONS AND NECESSARY HORTICULTURAL LEGISLATION.

By Alexander Craw, Quarantine Officer and Entomologist of the State Board of Horticulture.

The possession of our new territories of Hawaii and the Philippine Islands brings up a question of very serious moment to the horticultural interests of the United States, and more especially to California and the Pacific States, as at our ports are liable to be landed plants, trees, and fruits that are infested with new and destructive insect pests or tree diseases. Heretofore we have had no direct communication with the latter islands, and with the exception of a few lots of *Phalanopsis* (orchids), I have only inspected two plants that I know came from there. We have had nothing in the plant line whereby we can ascertain the species of insects peculiar to that country. I am not aware that anything has been published in relation to tree or fruit pests of the Philippines. It is different in the case of the Hawaiian Islands, for we have a very good knowledge of the great list of destructive insects that attack their plantations and forests, and that are foreign to our orchards and gardens. Some of them are of recent introduction into the Islands, but from the number and variety of plants found infested and destroyed, I am sure our State would soon be overrun with them if a thorough quarantine cannot be maintained. This is the point to which I desire to call particular attention. Until Congress ratifies the annexation treaty, the Islands are considered foreign countries; so all ships arriving from there are inspected by customs officers, and one or more customs officials are on guard day and night while the ships remain in port. The Surveyor of the Port, Hon. Joseph S. Spear, Jr., and his first deputy, Chauncey M. St. John, like their predecessors, very kindly issued instructions not to allow any plants or fruit to be landed until inspected by an officer of the State Board of Horticulture. The customs officers, inspectors, and dock officials are very obliging and gentlemanly in the enforcement of this order. The value of this assistance to the State cannot be estimated. Under such an arrangement, no plants can be smuggled away, to be afterwards landed. The annexation of the islands dispenses with the services of customs officers to inspect the ship or the passengers' baggage upon arrival, and our horticultural regulations do not confer upon us the right to interfere with the personal effects or baggage of passengers, unless it is plants or fruit.

Now, it is very rarely that plants are packed with personal effects, but when passengers or members of the crew ascertain that valises are not to be inspected, the inducement will be greater to try to get their plants ashore. Most people—not fruit-growers—consider it rather high-handed officiousness for us to even inspect their plants, and when the latter are found infested with insects and confiscated, they consider that they are out and injured, but never take into consideration the fact that those harmless looking specks, or bugs, if allowed to land, would probably cause a loss of thousands of dollars to other citizens who have invested their all in planting and caring for an orchard.

The only safeguard that I can suggest to prevent, to a great extent, any attempt at landing plants without inspection, would be the enactment of a State law making it punishable by fine to bring into California any plants or trees without immediately notifying the Quarantine Officer of the State Board of Horticulture, or the quarantine guardian of the district in which said plants or trees are received. As no penalty is attached to the violation of Rule I of the regulations of this Board, it is practically a dead letter, although the Southern Pacific Railroad Company has rendered us very valuable service by keeping us advised of arrivals of trees and plants by rail from outside the State. The State Board of Horticulture, under the power conferred upon it by Section 5 of the Act of March 8, 1889, adopted rules and regulations to prevent the introduction of insect pests and tree and plant diseases, but it had no power to attach a penalty, so in order to make such regulations effective we will have to submit a bill to the Legislature providing penalties for non-compliance. Unless this can be done at the forthcoming session of the Legislature, we are liable to have the work done in this line during the past few years completely nullified in the future.

I desire to mention a few of the more serious insect pests and tree diseases that have proved to be very injurious in other countries and States, and which we have no reason to believe will prove less destructive if introduced into California.

Probably the most serious would be the introduction of the gypsy moth from Massachusetts, Europe, or Japan. The caterpillars of this moth devastate forest trees as well as fruit and ornamental trees and plants. The people of California would be up in arms if the State Board of Horticulture asked the Legislature for an appropriation of over a hundred thousand dollars a year to fight a single pest, as they are now doing in Massachusetts to try and stamp out this insect that was introduced into that State from Europe over twenty years ago.

The "peach yellows," or the "peach rosette," it is claimed, would not spread in California, but the advice of Eastern experts in tree diseases is to keep it out. Now a new peach disease, called "small peaches," is reported from Michigan, where four thousand acres are stated to have been killed by it. A peach root aphis was introduced into Delaware, Virginia, and Maryland, probably from Australia. Dr. E. F. Smith, of the United States Department of Agriculture, reports having seen a nursery of 100,000 peach trees killed outright by this pest in *three weeks time.* One shipment of 19,000 peach trees was brought into California. I found them to be infested with this pest, and the trees were destroyed. It also attacks plums and prunes.

In Louisiana a species of "saw-fly" has made its appearance, which completely defoliates peach and prune trees. "In about two years they kill an orchard effectually." Prof. H. A. Morgan, of the Experiment Station, Baton Rouge, La., reports this pest as steadily becoming more numerous, until now it may be considered one of the worst enemies of the plum and peach trees of that State.

The introduction of the plum curculio would reduce the profits of prune, apricot, and cherry growers.

The fruit fly in Australia and the larvæ of a beetle, *Doticus pestilens*, in the same country, burrow all through the pulp of apples, completely ruining them.

The peach fly, in the islands of Bermuda, and a similar pest in Cape Colony, makes peach-growing for profit impossible, as most seasons they have not enough peaches for local consumption.

The disgusting Mexican orange maggot, if introduced into California orange groves, would soon stop the consumption of our luscious Navel and other oranges. You can tell a wormy apple, but it is almost impossible to detect a maggoty orange until it is cut.

A new worm infests apples in Japan, and it is now reported in British Columbia, introduced from the former country.

You can kill the so-called "San José scale" with sprays, but triple strength of the best insecticides will only kill seven per cent of the destructive white scale (*Diaspis amygdali*) found in the West Indies, Brazil, Australia, Japan, and the Hawaiian Islands. This pest is a very general feeder. We have destroyed the following trees and plants entering this State, infested with it: Peach, plum, cherry, walnut, persimons, tea, euonymus, sago palms, and zanthoxylum.

The introduction of the so-called Japanese beetle (*Adoritus umbrosus*) from Honolulu would be a bad importation. On the Islands they defoliate grapevines, peaches, and in fact nearly all kinds of trees and plants are subject to their attack.

The "red wax scale" was introduced into Honolulu a few years ago; and now we find it upon a great variety of plants brought from there, as well as on the evergreen "leis" or wreaths with which the Hawaiians decorate their departing friends.

A great variety of scale insects foreign to California are found on the Hawaiian Islands. One species, the "mining scale," *Howardia (Chionaspis) biclavis*, is one of the most serious. This is the scale that infested the 325,000 orange trees from Tahiti that withstood five fumigations with double and treble strength hydrocyanic acid gas and two immersions in strong insecticides. How could such a pest be even held in check in an orchard?

The citrus district of Oroville quite recently had a narrow escape from infection by the "mining scale," as well as the "purple scale." Four boxes of orange trees arrived on November 25, 1898, ex brig Galilee from Tahiti for Oroville, that were seriously infested with both scales, as well as a small black *Aspidiotus*. The trees were destroyed.

The list of dangerous insects could be extended, but the foregoing will suffice to demonstrate that the fruit growers of the state should urge the passage of a bill that would reduce to a minimum the possibility of such pests, or diseases, gaining a foothold or becoming established in California orchards.

REPORTS OF COUNTY BOARDS

OF

HORTICULTURAL COMMISSIONERS.

1897-98.

REPORTS OF COUNTY BOARDS OF HORTICULTURAL COMMISSIONERS.

[Section 17, Statutes of California, 1889, p. 91, and Section 4, Statutes of California, 1897, p. 246, provide: It shall be the duty of said County Board of Horticultural Commissioners to keep a record of their official doings, and to make a report to the State Board of Horticulture, on or before the first day of October of each year, of the condition of the fruit interests in their several districts, what is being done to eradicate insect pests, also as to disinfecting, as to quarantine against insect pests and diseases, and as to carrying out all laws relative to the greatest good of the fruit interest. Said Board may publish said reports in bulletin form, or may incorporate so much of the same in their annual reports as may be of general interest.]

ALAMEDA COUNTY.

To the Honorable the State Board of Horticulture:

GENTLEMEN: We have the honor to submit herewith the following report: Alameda County has more nurseries and florist's gardens than any other county of the State, and we might say more orchards. The proprietors are importing and shipping trees, plants, and bulbs to all parts of the United States and to foreign countries, there to promote and foster the horticultural interests of this great industry. We have frequently visited nursery establishments, orchards, and vegetable gardens, and have faithfully and effectively coöperated with horticulturists in eradicating fungous diseases and insect pests. The condition and healthy appearance of our nurseries, orchards, and gardens is remarkable, and especially when we look back and see the many annoying and destructive scale pests, aphis, worms, and fungous diseases infesting fruit and ornamental trees.

The introduction of beneficial insects has effectively checked the scale pests, and the good results are seen in most of the orchards in this county. We are sending colonies of *Rhizobius ventralis* and *Vedalia cardinalis* to infested orchards. Millions of these workers are now feeding on the cottony cushion scale that infest acacia trees that line most of our streets and avenues in Oakland. The large importations of fruit trees and plants that come to nurserymen, orchardists, and private parties have been closely inspected, and effective measures taken to quarantine all importations that had insect pests on them. Some trees we have destroyed, and many trees we have carefully fumigated at the importer's expense.

Though many cases and boxes of trees and plants were received from foreign countries during the past season, all required careful inspection, and it was noticeable that there was a decided improvement in most imported plants and trees—that is, they are cleaner and more free from fungous diseases and insect pests than former importations. The condition of the orchards in this county is remarkably good, and by continual vigilance and effective coöperation with all parties interested in horticultural work we will have clean orchards and clean fruit.

Respectfully submitted.

W. D. PRYAL,
EDW. O. WEBB,
WM. BARRY,
Commissioners.

OAKLAND, October 15, 1898.

To the Honorable the State Board of Horticulture:

GENTLEMEN: Two years ago a paper was read before the fruit-growers' convention at Sacramento which showed the work done in the southern part of Alameda County by the *Rhizobius ventralis* and the good results in eradicating the black scale in the orchards in this district. Where I had collected thousands of the beetles last year I could not find any this year; they had done their work and, like their migration from the olive grove of Mr. Ellwood Cooper, of Santa Barbara County, I found them in another locality about half a mile from their feeding ground of last year. That they are cleaning the orchards of the black scale is acknowledged by all the fruit-growers in this locality. The largest orchardist in this district, Mr. Shinn, of Niles, told me voluntarily the other day that he was perfectly satisfied that the *Rhizobius* had done better work than he ever expected it could do.

The only pest that infests the orchards at present in this district is the "brown apricot scale," and this year I have succeeded in introducing the parasite of that scale, the *Comys fusca*. These I found in quantities in Santa Clara County, where, through the kindness of Mr. Ehrhorn, commissioner of that county, I succeeded in collecting some twenty or thirty thousand and placed them in the orchards throughout this district. If they do as good work here as they have done in Santa Clara County we will be perfectly satisfied.

This year I have so far collected and distributed about one hundred and thirty colonies of the *Rhizobius*, for I find that so long as they can be collected so easily here, it is better to keep putting them in the orchards, although I find it almost impossible to persuade the orchardists to place anything in their deciduous trees to protect them during the winter.

Mr. Craw visited this part of the county during the latter part of September, and expressed himself as well pleased with the work done by the beetles. The following clipping expresses his views regarding what he saw in his trip through the township:

> **Alexander Craw, State Horticultural Quarantine Officer, of the State Board of Horticulture, was in Niles recently, the guest of William Barry, of the County Board. He spoke very highly of the work of Mr. Barry, and urged that the orchardists follow the suggestions made by him regarding the placing of corn husks in the crotches of deciduous fruit trees before the leaves fall. "This," he said, "will give the beetles protection and they will be in the trees in the spring ready for work. I have made a trip around Washington township and find that olive, orange, and lemon trees are entirely clean. I never saw cleaner trees than those on Mr. McIver's place. These beetles did the work without the cost of a cent where $800 failed to do it in other ways."**

Respectfully submitted.

WILLIAM BARRY,
Horticultural Commissioner for Alameda County.

NILES, October 23, 1898.

FRESNO COUNTY.

To the Honorable the State Board of Horticulture:

GENTLEMEN: We desire to submit the following report to your honorable Board:

Fresno County has an area of 5,606 square miles, or 3,587,840 acres, being larger than Connecticut, and nearly three times the size of Delaware.

The fruit industry of Fresno County has grown till it is the chief industry of our county. While many of the products of our county are very important, the fruit interest is by far the most important, and takes the lead, and justly so. The yield of fruit this fall is very good, considering the late, cold spring we had. The quality, also, was very good. In fact, the quality of our fruit is gradually coming up, and we expect to so prosecute our work as to raise the standard of our fruits fast and high. This is our aim. And realizing the fact that the large yield and superior quality of our fruits can only be preserved by keeping our trees clean, healthy, and vigorous as possible, we, the Commissioners of Fresno County, have required those having orchards infested with scale or insects of a pernicious character to use those sprays and washes most destructive to such insect life. The people generally, in response to our requests and our notices, have cleaned up their orchards, and did the work promptly, and, in most cases, satisfactorily. The necessity for spraying and using all practical means for checking and eradicating all injurious scale and insects is being recognized more and more by our orchardists and vineyardists here, and when we get them all to work with us in carrying out the very purpose for which our County and State Boards were organized (and that is, in brief, to protect and enrich the ranchers), we feel that the victory is almost won.

While we have done much work in the past here, there remains much to be done. Our acreage to inspect covers a large territory. Most of the orchards visited have one disease or another, and need treatment. Some of our worst enemies are: Root knot, San José scale, codling moth, brown apricot scale, pear blight, woolly aphis, red spider, and many other pests of less importance.

We diligently traveled last fall, inspecting orchards and serving on those whose orchards were infested notices that they must spray, and use all practical and approved means for destroying pernicious scale and insects. We have earnestly used the power vested in our board for the good of the ranchers, and when our notices, advice, and requests were unheeded, we have used the compulsion the law gives us, and forced some to do their duty. The benefit derived from such strict and judicious measures is becoming apparent to all, and to none so much as to the orchardists and vineyardists themselves. We have reason to believe, and are proud of the fact, that there was more pruning out of dead wood, more spraying and cleaning up generally, last spring, than was ever done here in any one year previous. These things are gratifying to us, as we know that the life of our fruit industry lies partly in pruning and spraying, and doing it well. Next spring we are going to push this work right along, and have already traveled over a good deal of territory, and served many notices on fruit-growers to clean up and spray in the spring.

Our citrus trees are comparatively clean, having no very injurious scale on them, and, in fact, very few of any kind. A few soft-shell species only are to be found. We have exercised our right in the matter of quarantining scale-infested fruits, trees, etc., shipped into our county, and have quarantined and caused to be disinfected all fruits, trees, shrubs, plants, etc., found so infested. We find that we must be very careful and watchful in this matter, and exercise a strict quarantine, or we will get some of the most injurious and hard-to-get-rid-of pests scattered over our county. Fruit with scale on it is shipped in, and in some cases our ranchers will take the same boxes it was shipped in, still disinfected, out to their ranches; and thus the pest is introduced. We quarantined some oranges and lemons lately that just this thing was happening to. We expect rigidly to enforce the quarantine law, and thus prevent the spread of insect pests and the shipment into our market of much that is objectionable.

Respectfully submitted.

E. C. MARSHALL,
J. A. ROSE,
ELI HENDERSON,
Commissioners.

FRESNO, October 3, 1898.

KINGS COUNTY.

To the Honorable the State Board of Horticulture:

GENTLEMEN: The duly appointed Board of Horticultural Commissioners for Kings County respectfully submit the following as their report:

Our duties commenced January, 1898, and we divided the county into three districts, viz., Hanford, Armona, and Lemoore. During our inspections of the different districts we found many orchards affected more or less with the San José scale, and occasionally we found the brown apricot scale. We found that the osage orange fence, wherever grown, is the greatest harbinger and breeder of the San José scale. The fruit-growers begin to realize this fact, and by the advice and instructions of this Board, we may say that miles of such fences have been rooted out and destroyed by the owners. We find that the pear blight, both twig, and crater, had in some orchards got a serious start; but by persistently urging upon owners the necessity of heavy pruning and thorough spraying of the infested trees the disease is becoming less, and by close attention will be entirely eradicated.

The positive cause of the blight on prune trees in this and the adjoining counties of Fresno and Tulare in some localities is becoming a serious question to solve. Trees growing on different kinds of surface and subsoil are affected alike, whether grafted on peach or myrobolan seedlings—indicating that it is more of a climatic disease than anything else, although the trees that have been allowed to bear too prolificly are the most affected.

Fruit-growers throughout the county generally have acted in harmony with the Commissioners in following instructions in regard to spraying for both San José scale, codling moth, and insect pests. During the months of June, July, and August, the red spider and the mite have been very injurious in many parts of the county to the prune and in some instances to the apple and pear trees, but mostly to the prune. Very many trees are almost totally denuded of their foliage, which undoubtedly will have a tendency to injure the vitality of the trees. In all instances where the advice of the Commissioners was followed (viz., that when orchards were affected with the red spider and mite, in different parts, to immediately, say about 4 P. M., spray thoroughly with clear water, which will clear the pores of the foliage of all dust and cobwebs; the next evening, the foliage being dry, dust thoroughly with fine powdered sulphur, and not to overlook any tree, whether affected or not) the invigorating effects to the trees were perceptible in a very short time. The trees retained their foliage, the spider and mite disappeared, or were destroyed, and have not made their appearance since, and the trees are more vigorous and healthy, while orchards almost adjoining that were not treated by spraying, etc., are almost bare of foliage and have made no further growth.

The climatic changes in the months of February and March were very peculiar and disastrous to the fruit industry of this county, particularly were the apricot, peach, and prune affected; the pear and grape not so bad. The peach, apricot, and prune yield has been but very little, if any, above what is necessary for home consumption. The pears on an average yielded a half crop, and several carload lots were shipped from here. In February and early March the orchards were very promising, all varieties of fruits displaying more blossoms than any previous season. The new wood on the peach, apricot, and prune was very much advanced up to the 13th of March, when a sudden and severe north wind and frost commenced and lasted for three or four days and nights. The consequence was that many trees, particularly apricots of the ages from three to six years, that were growing very vigorously, and the sap flowing freely, were suddenly checked, and from the ground up nearly all the trees thus blighted died, but the roots apparently were not much affected, as at the present time many young shoots have started up and are from three to five feet in height and large enough to be budded.

In the early spring some vineyards were becoming badly affected with the thrip, or hopper, but the sudden change in the weather seemed to eradicate and destroy them, and from late observations in the different districts the many insect pests are being destroyed. The squirrel pest, however, in many places seems to be on the increase, and are very injurious to many vineyards as well as orchards. But we hope that before the next spring opens we will, jointly with the aid of the fruit-growers and the Supervisors, be able to exterminate them.

We find that nurserymen and others have disposed of, for orchard purposes at home, about 38,000 fruit trees, the Bartlett pear predominating. There were imported into this county from France 30,000 seedling pear and myrobolan, and other varieties of shrubbery. There were imported from Fresno County 60,000 Seedless Sultanas, and one lot of imported orange trees was quarantined and returned to the party sending them here. We also find that there has been a greater demand for all kinds of hardy ornamental shrubbery, bulbous roots, roses, and other exotic plants than has been disposed of heretofore.

In connection with the fruit industry of this county, we report that there has been added a much needed cannery, and also a raisin-seeder, both located in Hanford, and are very much appreciated by the public. From the opinions generally expressed, by the time the next season's crop matures, there will be a much needed distillery erected in the county.

All of which is respectfully submitted.

B. V. SHARP, President,
H. W. BYRON,
JAMES A. HILL, Secretary,
Horticultural Commissioners.

HANFORD, September 29, 1898.

LOS ANGELES COUNTY.

To the Honorable the State Board of Horticulture:

GENTLEMEN: We, the Horticultural Commissioners of Los Angeles County, have the honor to submit for your consideration the following report:

On the first day of May last we were installed as Horticultural Commissioners of this county, and assumed the duties of the office. A general inspection of the orchard sections of the county was made by us during the first month, for the purpose of dividing the county into convenient districts for inspection. It was found that the purple scale (*Mytilaspis citricola*) existed in several orchards, and after being located, a complete list of such places was kept; the same course being pursued in respect to other scale and insect pests destructive to fruit and fruit trees; with the result that the commission formulated a plan of work for the destruction of orchard pests in the manner most effective, cost considered. After consulting with owners of infested orchards, they were advised to aid in the good work by spraying, fumigating, or taking such other measures as would be suggested by the commission. They have responded quite generally, with the result that, at the present writing, the destruction of orchard pests in Los Angeles County is something unprecedented.

We have collected and distributed over 50,000 of the parasite *Rhizobius ventralis*, for the black scale, and believe in time they will prove a great friend to the fruit-grower in destroying this pest. This parasite has been distributed in 370 orchards, widely separated. We have had calls for, and supplied, 19 colonies of the parasite *Vedalia cardinalis*, for the cottony cushion, or white scale, which still exists in a few places. The mealy bug (*Dactylopius destructor*) was found to be an orchard pest at Monrovia, and to some extent near Downey. Black scale (*Lecanium olea*) was found a citrus tree pest throughout the county, with the possible exception of the San Fernando Valley, which locality appears practically free from insect pests of all kinds.

Inspectors have been at work in the orchards most seriously infested, reporting the condition of same, both to the owners and to the Horticultural Commission. There have been 2,048 orchards, etc., so reported to date.

Fumigation has been progressing for several weeks in the orchards in and near Monrovia, Duarte, Azusa, Arcadia, Glendora, Covina, and Sierra Madre, at the rate of from 2,000 to 8,000 trees per night, and will be so continued to the end of the season. There are from 500 to 600 tents, all using hydrocyanic acid gas, made only from the very best of chemicals. There have been fumigated so far this season 139,000 trees, and the end is not yet; many thousands more would be fumigated could tents be had. Commissioner J. M. Thomas has had this territory under his personal supervision. Spraying has been, and is still, in a measure, resorted too, and with very beneficial results; in fact, we have good reason to look forward to a time when all scale pests are exterminated, or at least so reduced in numbers as to be easy of control. There have been 185,000 trees sprayed to date.

Fruits infested with red scale (*Aonidia aurantii*) have been rigidly quarantined and dealers made to understand that the handling of fruits so infested would not be tolerated; and to-day, Los Angeles fruit-stalls contain nothing but clean fruit, with the exception of a little San José scale and codling moth infesting apples and pears, which will be eradicated in the near future. In the City of Los Angeles, as well as in many other localities, hundreds of old trees have been cut down, that were not worth cleaning, and such work is still going on. We have eight competent inspectors at work in localities where scale and other insect pests are most prevalent, and complete unanimity exists in our department. The destruction of orchard and fruit pests is our only theme, and we believe that success must crown our efforts.

Steamers plying between San Francisco and Mexican and South American ports, stopping at ports in this county, are inspected each trip, to see that no insect pests injurious to plants or fruits are introduced.

The several railroads operating in Los Angeles County have kindly responded to our requests, in notifying us of the arrival or shipment of commodities coming under our jurisdiction. Fruit exchanges, commission houses, and others dealing in fruits and fruit trees have quite generally signified a desire to obey our injunctions as to the handling of or dealing in infested stock, and we feel quite satisfied with the work accomplished so far.

We have received from your Secretary, Mr. B. M. Lelong, a quantity of State reports (Fifth Biennial), which we take great pleasure in distributing where they will do the most good. United States Senator Stephen M. White also forwarded to our office several hundred copies of the U. S. Agricultural Department Yearbooks for 1893, 1894, 1895, and 1896; also, a copy of "Insect Life," published by the United States Government, and other farmer's bulletins, etc., which we are also distributing.

The fruit crop here will be well up to the average this season, both in quantity and quality, with the prospects of good prices generally.

Respectfully yours,
E. H. RUST,
C. G. KELLOGG,
J. M. THOMAS,
County Board of Horticultural Commissioners.

LOS ANGELES, September 30, 1897.

To the Honorable the State Board of Horticulture:

GENTLEMEN: The Horticultural Commission of Los Angeles County submits the following report for your consideration:

The past year has been in many respects very trying and severe upon the tillers of the soil in this county, and horticulture has suffered accordingly. Last winter the rainfall was very short, and then, to make matters worse, the severe frost in many places materially injured the orange and lemon crop; so, with the dry year, the frost, and all together, we have not so cheering a report to make as we otherwise would, but still we are not discouraged, for our irrigation facilities have made it possible for orchardists to pull through the dry season, and generally with a good crop of very fine fruit, which, we are happy to say, bids fair to bring profitable prices to the grower.

The grain and hay crop was very light all over the country; except in the naturally damp lands, where fair crops prevailed with good prices, fodder for stock has been the past summer a very scarce article, and in consequence owners of cattle, especially milk cattle, have been forced to economize in every way. So in driving over the country we notice the erection of large numbers of silos for the storing and preserving of green fodder, such as corn, alfalfa, and any other surplus green feed that would not keep; the silo is a great factor with stockmen in a dry year. We shall bridge over quite well the dry season after all.

The work of the Horticultural Commission has been, on the whole, a success during the entire time since the present Board has been in office.

The nursery business has been very poor, compared with other years, for reasons before stated. Tree-planting has taken a rest, and a great number of our old nurserymen have gone out of the business entirely; but should we have a proper amount of rain between now and March 1st, some one will sell nursery stock, for there will be a brisk demand, without doubt, and those that have trees to sell will wear a smiling face, and the ones that went out of the business will be growling at their hard luck.

Orchard-cleaning has progressed in a wonderful degree since making our report last year. Fumigation with hydrocyanic acid gas has superseded almost entirely all other methods for the destruction of scale and insect pests on citrus trees. Black, red, and yellow scale are easily destroyed by this method, as we positively know by experience. About six hundred fumigation tents will be in constant operation in this county during the months of August, September, and the greater part of October, November, and December, and will result in the thorough cleaning of over 800,000 citrus orchard trees during the two past seasons, 1897 and 1898; and still the good work goes on. Fruit grown on trees that have been fumigated properly is bright and clear and requires no washing, thus saving a large item to the grower, and increasing the market value of the fruit, as every shipper can testify. We, without any hesitation, most heartily recommend the hydrocyanic acid gas treatment.

The purple scale has obtained a foothold in some parts of our country to such an extent that it has been a serious matter to decide what best to do. We have experimented with various preparations as spray washes, but with no satisfactory results, and the practice has now been almost entirely abandoned. We have tried fumigation, in some cases leaving the tents over the trees all night, in other cases we have used double quantities of cyanide and sulphuric acid, but with only partial success, and as a last resort our Board of Supervisors has yielded to our constant appeals, and has sent Mr. George Compere, who is a well-known and competent person in insect work, to Hawaii, to collect and send back to our country what is reported on good authority to be the true parasite for the purple scale, namely, the *Chilocorus circumdatus*. Should we succeed in colonizing successfully here this ladybird, and the reputation given it holds good, we confidently look for a solution of the question of controlling the most obstinate of all our scale pests. The mealy bug, we find by experience, readily yields to fumigation. The parasite, *Cryptolæmus montrouzerii*, has been introduced in several cases here for the destruction of mealy bug, but, so far as we have observed, has been of very little value. The question of parasites generally might be properly noticed right here. We are quite familiar with some of them. For example, the *Rhizobius ventralis* we believe is valuable as against black scale, and probably nearly all of the *Lecaniums*. Of course, we must not overlook the little *Rhizobius towoomba*, or brown-neck, as it is commonly called. We find this little ladybird working in harmony with *Rhizobius ventralis*. The twice-stabbed ladybird seems to be on the increase here this year, and has done very good work in orchards infested with black scale. We therefore are much in favor of parasites, for the control of scale pests in the years to come, and believe that every opportunity should be taken to procure and foster useful parasitic insects.

The commission in this county has an office in the county courthouse, and the office is growing in equipment and consequent usefulness right along. During the past year we have added to our office a very good microscope, which was much needed, and proves to be the best investment made for the department. Since the commission was first organized, by its aid we have been enabled to decide matters of interest to the fruit-grower that could not have been done without it.

At the request of Dr. L. O. Howard, Chief U. S. Entomologist at Washington, we have carefully bred the winged insect from maggots found in countless numbers infesting crude petroleum oil in the City of Los Angeles, and the fly has been named *Psilopa petrolei* by Coquillett. We are not aware of any damage being done by these insects, but the fact of living in the crude oil seemed so unusual that we called Mr. Howard's attention to the matter, with the result previously stated.

The San José scale still continues to be a serious pest here, but is controlled very effectually when treated with the lime, sulphur, and salt wash, if properly prepared and applied.

Codling moth is on record in almost all of the apple orchards of the valleys of this end of the State. We know of no better treatment for this pest than the Paris green wash, persistently applied; and for shot-hole fungus we recommend the Bordeaux mixture. Woolly aphis is in evidence also, but is not a very serious drawback. Our force of inspectors has been reduced largely during the past six months, on account of the stagnation in tree-planting, etc.

We have taken a very decided stand against allowing scale-infested fruit to be sold in this county, and have carefully watched the various packing-houses, markets, fruit-stalls, peddlers, etc., and as a result there is no scale to be found upon fruit offered for sale within our county. With the opening up of the newly-acquired islands in the Pacific, the probable construction of the Nicaragua Canal, and, locally, the improvement of the San Pedro harbor and building of the new Salt Lake Railroad, we look for an era of prosperity such as has never been seen in Southern California; and notwithstanding our rainfall is not up to our wishes and requirements for a bountiful harvest this coming season, still our prospects are very bright indeed, considering all things together.

Respectfully submitted by the Board of Horticulture of Los Angeles County.

C. G. KELLOGG,
Secretary.

LOS ANGELES, September 30, 1898.

MADERA COUNTY.

To the Honorable the State Board of Horticulture:

GENTLEMEN: The Madera County Board of Horticulture was organized on December 22, 1897. The county was divided into three districts, each district under the charge of one of the commissioners. The county being one of the new ones of the State, the work of the commission has, so far, been one of discovery of our orchard needs, and of preparation to meet them more thoroughly as soon as possible.

WESTERN DISTRICT.

By F. J. QUANT.

Since our organization last December, I have visited all of the orchards of my district. With the exception of a few on the San Joaquin river bottom, where I find some scale and codling moth, the orchards are almost entirely free from insect pests. Some of our pear trees are affected with a leaf fungus that will require treatment this winter. The red spider, which made its appearance about two weeks later than usual, was very bad on our prune, apricot, and pear trees. I am sorry to say, many of our orchards are dying for the want of care, but, as a general thing, they are well cultivated in this district.

MADERA DISTRICT.

By THOMAS OSBORN.

In this district are about five hundred pear trees affected with a blight that I think is superinduced by alkali in the soil, from the fact that the trees are most affected where that salt is most abundant. The tree absorbs more of the alkali than it can assimilate, and appears to throw the effect off at the top in a yellow, waxy substance that harbors the eggs of insects or induces disease.

The red spider is becoming a destructive pest in our prune orchards. The winds carry them by the million from their natural hatching grounds among the willows and other wild growth along the river-beds, and the adjacent orchards suffer greatly, and the prune appears to suffer most from its attacks. How to counteract their destructive work is a hard problem. I fear the prune industry in our hot valley, and particularly near our river channels, will have to be abandoned.

MOUNTAIN DISTRICT.

By Frank Femmons.

Most of our orchards are small, from a few trees for family use to a few hundred, where some fruit, principally apples, is produced for market. Apples, peaches, pears, plums, and grapes where properly cared for reach a high excellence.

Very few imported insect pests have, as yet, gained much footing in this district, and most of our native ones have their natural enemies that keep them in check.

The codling moth, or apple worm (*Carpocapsa pomonella*), has been introduced into one or two orchards, and will require careful attention. Some years a white, powdery mildew affects the foliage and fruit of some of our orchard trees.

What I find doing our orchards most harm is what appears to be a native insect of the leaf-hopper (*Jassedea*) family, and I am confident has a wide range and is doing much damage to our apple crop throughout this mountain fruit belt. It has evidently been at work in our older orchards for a number of years, and many trees are dead or dying from its effects. I do not find it mentioned in any of our horticultural literature, and I cannot help thinking it strange that it has not before attracted attention.

THE COUNTY AT LARGE.

In common with most of the Coast, and also of the Eastern States, the late frosts and unfavorable weather of last spring left our fruit crop "spotted." In this county the small rainfall of last winter and the hot, dry summer have greatly diminished our earlier prospects, yet our crop of peaches and apricots has been above the average of this part of the State.

The apple crop of the mountain section was very promising, but in most of the orchards the lack of usual moisture will greatly reduce the size and quality of the late varieties.

The future of our fruit production is bright with hope, and when our varied natural resources are properly developed our county will stand high among California's best.

Respectfully submitted.

F. J. QUANT,
THOS. OSBORN,
FRANK FEMMONS,
Horticultural Commissioners.

Madera, September 24, 1898.

PLACER COUNTY.

To the Honorable the State Board of Horticulture:

GENTLEMEN: Our county was divided into three districts (a description of said districts was reported to your Honorable Board). George W. Applegate was appointed to District No. 1, I. R. Cross to District No. 2, and J. B. Sisley to District No. 3. I. R. Cross (post office address, Auburn) was elected chairman, and George W. Applegate (post office address, Applegate) secretary. Mr. Sisley's post office address is Penryn.

Our chairman, I. R. Cross, of District No. 2, has submitted to our Board the following report, which has been adopted by us as our views upon general subjects discussed:

We have held monthly meetings and reported to our Board of Supervisors. The San José scale and the codling moth are the principal pests of our deciduous orchards, the latter being the most troublesome, and unless great vigilance is exercised in spraying in spring and early summer the apple and pear crop is about half destroyed for commercial uses. Generally the proprietors or renters were willing to spray when requested to do so, thereby destroying or mitigating the evil to an appreciable extent (a large portion of our people need no one to call their attention to the proper work to be done).

The combined labors of inspection of the various orchards in the Second District represent 108 proprietors interviewed and an area in fruit of 1,360 acres examined.

The fruit crop in the south and central portions of the county has been exceptionally good, notwithstanding the severe frosts prevailing in the spring, and prices have been remunerative.

The fruit interests are in better condition than in many years past. The peach has proved the most profitable fruit grown this year in the central and lower portions of the county, either shipped to the East or for local canning, which should and will in all probability increase the planting of many young orchards during the coming season.

The olive is now extensively planted, and many fine groves in full bearing have been a source of great profit to their owners. These trees, as a rule, are found clean from scale, exept in some cases of imported young trees, which at once were subjected to the usual remedies.

Although this county is not extensively engaged in citrus culture, yet it produces fruit of superior quality and very profitable to the owners. Some young orange orchards were found infested with brown scale, which have been treated with whale-oil soap solution.

The above inspections do not cover the whole area devoted to fruit in the county, large districts being in the hands of orchardists who require no stimulus to do their entire duty, and we desired to keep the expenses to the lowest minimum.

All shipment of trees or plants into the county, or therefrom, were thoroughly inspected before passing to the consignee.

District No. 1 comprises all the upper or foothill or mountain portion of the county, beginning at Clipper Gap, and including Applegate, Weimar, Lander, Colfax, Cape Horn, Secret Town, Gold Run, Dutch Flat, Alta, Towles, Blue Cañon, and Emigrant Gap, in all of which sections much fruit of superior quality is grown without irrigation; in the upper portion, pears and apples being the principal crop; in this portion all the deciduous fruits are grown. About 3,000 acres inspected are in fruit cultivation in this district. The yield of Bartlett pears is equal to that of all other kinds, and they command top prices.

District No. 3, including Newcastle, Long Valley, Penryn, Loomis, Rocklin, Roseville, Monta Rio, Lincoln, in fact all the territory to the Sutter and Sacramento county lines, yielded a remunerative crop of fruit, notwithstanding a year of drought and frost.

All of which is most respectfully submitted.

I. R. CROSS, Chairman,
J. B. SISLEY,
GEORGE W. APPLEGATE, Secretary.

AUBURN, October 1, 1898.

RIVERSIDE COUNTY.

To the Honorable the State Board of Horticulture:

GENTLEMEN: The Board of Horticultural Commissioners of Riverside County herewith submit their report for the year 1897.

The present board was organized June 9, 1897, under the legislative Act approved March 31, 1897, with G. W. Van Kirk of Corona as president and W. B. Hunter of Riverside as secretary. On September 1st, Secretary Hunter resigning, W. F. Budlong of Perris assumed the duties of secretary.

Riverside County has 17,730 acres of orchards, with 1,773,065 trees. Of this number 775,448 trees are in bearing, and 997,557 are non-bearing. The number of citrus trees is 1,177,038, and of deciduous trees, 596,027.

The assessed valuation of all trees and vines (only bearing trees and vines being assessed), is $612,126.

The condition of orchards generally is first rate, especially of citrus groves, which have never presented a better appearance. A very heavy crop now ladens the trees, of splendid quality, and estimated at 4,350 cars of oranges and 450 cars of lemons. The crop of deciduous fruits was large, of good quality, and about 50 per cent was dried.

It is estimated that the dried fruit produced was 89 cars, divided as follows: Apricots, 46 cars; peaches, 26 cars; raisins, 7 cars, of which 3 were Sultanas; prunes, 4 cars; pears, 3 cars; almonds, 3 cars.

The work of the commission since organization has been in the direction of thorough inspection of orchards in the districts most infested, and the employment of efficient methods of eradication applied promptly. There have been employed thirteen inspectors, in addition to the three Commissioners, and in the four months ending September 30th, 3,705 acres have been inspected.

The greater part of the time and energy of the commission has been directed against the red scale (*Aspidiotus aurantii*), resulting in making considerable progress against the ravages of this our most formidable pest. We are encouraged by present progress to believe that it will soon be under complete control.

The work in deciduous orchards will be prosecuted with vigor, several localities having serious infection of the San José scale.

The method of eradication of the red scale for the past one and one half years has been by spraying with a variety of washes, and was permitted by the former commission only for the reason of prevalent light crops and low prices, making the more expensive method of gasing almost impossible with the grower. The result has been a steady increase in the infection, and the thoughtful grower now advocates the only method: fumigation. We have, as have former Commissioners, been unable to successfully propagate a parasite for this pest, owing to difficulties of the climate.

Fumigation is carried on with hydrocyanic gas with two separate outfits, both belonging to the county and under supervision of the board. They are in charge of Mr. Thad. K. Seburn, superintendent of fumigation, a most careful and efficient man, who personally directs all work. The work is done for the grower at actual cost, and no private contract work is done in the county. The following formula of chemicals used to the tree has been found best adapted to our climate, and is effective to the most satisfactory degree. It is used on the principle of giving the tree all it will stand, thereby insuring the death of the scale:

Height of Tree.	Diameter of Tree.	Water.	Sulphuric Acid, 66 per cent.	Cyanide C. P., 98 per cent.
feet.	feet.	oz.	oz.	oz.
6	4	2	1	1
8	6	3	1½	1½
10	8	5	2½	2½
12	14	11	5	5½
16	16	17	8	9
20	16-20	22	10	12
20-24	18-22	30	14	16
24-30	20-28	34	16	18
30-36	25-30	52	24	28

Ninety-nine per cent of the trees treated here have been twenty to thirty feet in height and of corresponding diameter.

Organization for the strict enforcement of quarantine regulations is being rapidly perfected. Careful inspection of packing-houses, fruit-boxes, ladders, bags, etc., will be followed during the season of shipment, and an effort will be made to induce packers to provide apartments for the fumigation of same.

Especial care is taken to prevent the importation into this county of the Mexican orange worm, and in this we are aided to considerable extent by the agreement of the different railroad companies to carefully fumigate all cars used in the Mexican orange trade.

An energetic effort will be inaugurated to procure for Riverside the establishment of an experiment station of the United States Department of Agriculture, Divisions of Entomology and Vegetable Physiology and Pathology. The great diversity of our horticultural products and the magnitude of the like interests of this county certainly will entitle our claims to substantial recognition.

Respectfully submitted.

GEORGE W. VAN KIRK,
W. B. HUNTER,
W. F. BUDLONG,
Horticultural Commissioners of Riverside County.

RIVERSIDE, October 1, 1897.

To the Honorable the State Board of Horticulture:

GENTLEMEN: The Board of Horticultural Commissioners of the County of Riverside, State of California, submit herewith their report for the year 1898, as provided for by law.

The County of Riverside has a total of 19,200 acres, with 1,923,165 trees, being an increase over last year of 1,470 acres, and 150,100 trees; a net increase of 8⅓ per cent. Of this number of trees, 1,269,240 are in bearing, and 653,925 are not bearing; 1,279,907 are citrus, and 643,258 are deciduous. The increase in bearing trees, largely deciduous, was 31 per cent, showing that our orchards are rapidly becoming productive.

The total assessed valuation of our orchards is $706,442, an increase in taxable wealth in the last year of $94,316, producing an increase in tax revenue, with a reduced tax rate, of nearly $2,000.

The past year has been a trying one with the orchardists of this section. With the long dry season came a scarcity of water in some new localities, and young trees have suffered to some extent; while in the older and better watered communities the low prices obtained for citrus fruits, our principal fruit product, was a cause of discouragement.

The crop of deciduous fruits was not so large as last year, but of fine quality, and commands fair prices. In citrus fruits there will be proportionally a greater production, but not in the quantity of last year.

The work of the commission for the past year has been chiefly among the older citrus groves, the work of extermination of the red scale being prosecuted with vigor and with substantial success. With the addition of a third fumigating outfit, we have been able to effectually check the ravages of this pest, and it is now under control in this county.

The operations against the pernicious scale have resulted very satisfactorily, giving a marked decrease in the infection, with a certainty of additional reduction being shown upon the coming winter inspection.

The actual reduction of red scale, taken from an average of orchards in the district most affected and in which the commission prosecuted the work the more vigorously, is 62½ per cent, and that of the San José scale, taken in the same manner, is 52½ per cent.

The commission has employed, during the past year, an average of ten inspectors per month, who have inspected 8,263 acres of orchards. This inspection consisted of a careful examination of each tree.

No new varieties of scale have been introduced into our county during the year, owing to the prosecution of the methods of quarantine outlined in our last report. No effort was spared by the entire force to perfect the system, and its workings were in the highest degree satisfactory.

The methods of extermination remain the same as last year, and, although thorough experiments have been conducted, no satisfactory improvement on them has been made.

Fumigation, honestly and intelligently performed, will give results in the eradication of the red scale not equaled in efficacy nor cost by any other method.

Spraying with the lime, sulphur, and salt solution for the pernicious scale has resulted in such a decrease of the scale that we may recommend it to the orchardist with the confidence of its complete success.

Respectfully submitted.

G. W. VAN KIRK,
W. B. HUNTER,
W. F. BUDLONG,
Horticultural Commissioners of Riverside County.

RIVERSIDE, October 1, 1898.

SAN BERNARDINO COUNTY.

To the Honorable the State Board of Horticulture:

GENTLEMEN: With the Horticultural Commission of this county, the past year has been prolific in the matter of making changes, and it naturally follows that to a certain extent this is a bar to progress.

After the legislating out of office of all the Horticultural Commissions in the State last March, our Board of Supervisors organized a new commission by the appointment of Messrs. Cave, Curtis, and Pease, on May 4, 1897, and on the same date the commission organized by electing S. A. Pease as chairman and R. T. Curtis as secretary. From that date to the present the commission is in excellent working condition, all the members working in harmony to the same end.

Undoubtedly one of our greatest menaces to the fruit industry is the importation of injurious insect pests on trees, shrubs, etc., from outside the county and State. We have no trouble in keeping *Icerya purchasi* in subjection by means of *Vedalia cardinalis* and *Novius koebelei*, which are perfect parasites in their line. With the red scale (*Aspidiotus aurantii*) it is a far different problem, the only available method of reducing it being by means of the hydrocyanic acid gas. Using this method we have been very successful, and have very few of the pests left to trouble our orchards.

The black scale proves to be our most serious pest, from the fact that it outnumbers all the other pests combined. We have used our best endeavors to exterminate this pest by introducing colonies of *Rhizobius ventralis* for four successive years, but without good results. It is still possible that this ladybird may gradually become acclimated to our dry interior climate, as did the *Lecanium oleæ* (see State Horticultural Report for 1883, page 21). While awaiting such an event, we have resorted to systematic fumigation, as the owners of orchards in the western portion of the county were almost unanimous in demanding that the Horticultural Commission do something to afford them relief.

We fumigate orchards in solid bodies, leaving no infested trees or orchards among them to immediately reinfest the surrounding groves. If *Lecanium oleæ* could be kept in subjection upon olive and citrus trees, we would have very little trouble from the infesting of orchards with this scale from the pepper, laurel, and other trees of their kind, as in our experience the latter trees only become infested after our orchards are fully stocked with the pest, consequently these might be termed an overflow. We are continually receiving proof that the work of the Horticultural Commission would be materially advanced if all orchardists would lend their willing assistance, instead of keeping under cover, as much as possible, the inroads of serious pests until their orchards become so thoroughly infested as to make it a very difficult task to eradicate them. We are also frequently reminded by articles from the press of the imminent danger of our orchards becoming infested with that most serious of all pests, *Trypeta ludens*, or Mexican orange worm, and unless an organized effort is made to keep Mexican oranges out of our State, disastrous results are sure to follow. We strongly urge a national quarantine law as a means of protection against this and all other serious pests that as yet have not obtained a foothold here.

While our Eastern people appear to be having serious trouble with the San José scale (*Aspidiotus perniciosus*), we have been enjoying a respite from its ravages. For several years this pest has been reduced to a minimum, in fact, so nearly exterminated that people have inclined to the belief that it had ceased to be a pest. At present it seems to be on the increase in many localities, and we feel sure will again demand our serious attention, unless some natural enemy interfere to check their further progress.

We have found a number of lemon orchards in which the fruit is slightly infested with *Aspidiotus nerii.* How serious this pest might prove, if unrestrained, is to us a problem, as authentic writings on this subject, so far as we are aware, are very meager. We shall take no great chances with them, however, but shall resort to fumigation wherever they appear. In all matters of this kind we sail under the banner, "No truce."

From all over this section come reports that the vine disease is worse than at any time since 1894, due probably to local conditions in the past year.

We have been confirmed in our opinion that indiscriminate transportation of picking-boxes from orchard to orchard and from infested sections, without fumigation, has been a source of great and unnecessary trouble through the spreading of insect pests. We have posted notices in all packing-houses and at other conspicuous places, calling attention to the law requiring all such boxes to be disinfected previous to being again used.

We have seen plants which came through the post office from Florida this season that were badly infested with *Mytilaspis citricola* and other dangerous pests, which calls up the fact that we are unprotected from that quarter—the post office.

The past year has produced the usual amount of root knot on nursery stock: *Bryobia pratensis* (red spider) on almond and prune trees, and *Lecanium hesperidum* on citrus trees. There is also some trouble in the older citrus orchards from *Gummosis*, the same as on deciduous trees. (See Agricultural Report for 1892, page 238.)

The orchards in the eastern portion of the fruit-growing section are practically free from insect pests, and being divided from the western portion by the pasture lands and alfalfa fields of the lower portion of the San Bernardino Valley, makes it of the greatest importance to have thorough fumigation of the fruit-picking boxes and of imported nursery stock, plants, etc., as there lies the greatest danger. It is our firm conviction, therefore, that it would be a great protection to this and other localities if your honorable body would add a clause to your rules and regulations allowing the quarantine guardians to disinfect all stock, plants, shrubs, etc., brought in from any place known to be infested by pests injurious to fruits.

To the end that we might be better prepared to disinfect all infested orchards, our Board of Supervisors authorized the purchase of thirty additional tents, and we now have one hundred and twenty tents of various sizes working on full time in the western portion of our county. In arranging to purchase additional tents we discovered in our own and other localities a wide difference in bids for tents of apparently the same size and description, this difference in some instances amounting to nearly 50 per cent, which, upon investigation, proved to arise from the lack of complete specifications. One bidder would specify diameter, height of sides, and height of center; while another gave only diameter and height at center. Where tents were made from the latter specifications they were convexed from near the bottom of tent to the apex, thus making a very unsatisfactory tent for our purpose. In our experience, from complete specifications there was very slight difference in the figures from five different bidders.

Quite a large acreage of fruit trees was planted in orchard form this season of both citrus and deciduous trees, and in all localities they show good growth and color.

The prune crop the past season was very light, owing to the trees dropping their fruit. Peaches and apricots were a good, fair crop. Orange trees generally have a good setting of fruit. Lemons are also a good crop.

We have seen a few peaches this season infested with the codling moth, which is a new feature in this section.

The food plants of *Aspidiotus juglans regia* here are in the order named—walnut, cottonwood, pear, and almond.

Approved by the Board of Horticultural Commissioners of the County of San Bernardino, State of California, and respectfully submitted.

S. A. PEASE, Chairman.
ROBT. T. CURTIS, Secretary.
B. W. CAVE.

SAN BERNARDINO, September 24, 1897.

To the Honorable the State Board of Horticulture:

GENTLEMEN: In making our report for the year 1898 we note, first, that the past year in many respects has been an unusual one.

Early in the year local frosts did some damage to the fruit crop on citrus trees, affecting possibly in this county 5 per cent of the crop. And later still another frost caused injury to fruit blossoms on all kinds of trees to a limited extent. This was principally on low lands and on the Mediterranean Sweet orange trees, apricots, prunes, and early blossoming peaches.

With oranges, the Mediterranean Sweets show very little fruit on the trees; the Navels have a good setting and of fair size; the Seedlings, a very light crop.

With the grapes, the vines show very plainly where there has been a lack of water, and more particularly where there has not been proper cultivation. In consequence, the raisin crop will be much lighter than that of last year as a direct result of these conditions.

The talk of a shortage of irrigation water may be heard on every hand, but probably the fear of an increased shortage in the immediate future is much greater than the actual shortage at the present time. There are probably localities where there has never been a sufficient supply for the acreage set to fruit. But we cannot fail to note the inclination of many people to cross the bridge before it is in sight. Probably this same feature might apply to the craze for digging up orchards or rebudding to other varieties of fruit. For instance, many acres of lemons have in the past season been rebudded to grape-fruit, for the reason that prices of lemons in 1897 were not entirely satisfactory, but the year of 1898 has proved to be an exceptionally favorable year, as lemons have commanded a very high price.

As to the manner in which budding should be done, we concede the palm to Riverside methods, viz.: Insert the buds in the old wood around the crown of the trees, and, after the buds are set, cut away the whole top of the trees; wax all places that have been cut, and then whitewash over the whole trunk of the tree, including the buds. In lieu of the duties depending upon the top of the tree that has been removed, allow the suckers to grow on the trunk of the tree to take up the surplus of sap, keeping them pulled off from close around the buds to avoid smothering the latter. By this method an average of 95 per cent of the buds usually grow, and one year or more in time will be saved over the method of growing suckers and afterwards budding into them and having two unions to heal over instead of one.

The number of trees shipped into the county during the past year and planted in orchard form, has been much less than for many previous years. Yet enough have been shipped in, that 4,000 trees have been condemned and destroyed on account of root knot, woolly aphis, and other troubles, either fungus or from insect pests.

For trees that are shipped in, when the parties are very desirous to plant them and the said trees are infested with scale, our method of dealing with them is to either fumigate them or, if for any reason that is not practicable, we have all foliage removed and the trees scrubbed with a stiff brush and a reliable wash. This has been done with trees infested with both the red and black scale, with very satisfactory results, the trees being thoroughly cleaned and turned over to their owner in good order.

The San José scale is still in evidence in some localities, and where it has been neglected it is increasing. This increase is due mainly to the desire on the part of orchardists to use some other and, as they think, "improved" remedy in place of the salt, lime, and sulphur wash. Possibly there may be other washes that will have effect on this scale, but they all lack one quality that our salt, lime, and sulphur possesses, and that is, that after going over the trees they do not show where portions of the tree were not covered with the spray. With our wash it is customary to go over a second time and patch the places not touched by the first application, and with good thorough work we think it possible to virtually kill all the scale at one spraying. Certainly not more than one-tenth of one per cent of the scale should be found alive afterward. We have seen the twice-stabbed ladybird eating the San José scale, but have never seen where the decrease in the scale was perceptible. The increase of ladybirds is too slow—they fail in numbers.

A few orchards only have been infested with *Aspidiotus aurantii*, or red scale. With this pest our only difficulty has been to have fumigated a sufficient number of trees surrounding the ones found to be infested. The average orchardist is willing to have all trees found to be infested disinfected, but none of those surrounding them. But during the past season we have endeavored to have all such orchards entirely fumigated for *Lecanium oleæ*, or black scale, and in this way have succeeded in exterminating the red scale most effectually. Our endeavors will be conducted on the same lines the present year, and we hope to wipe the red scale out of our county entirely by this means.

We have had one bad infection of *Aspidiotus citrinus*, which was cuddled along for a number of years. It was, among other things, supplied with a colony of *Coccophagus citrinus*, but it steadily spread until last fall, when it was fumigated. This has effectually put a stop, at least, to its spreading, and we hope it is entirely exterminated.

The *Icerya purchasi* has been very much in evidence this year. Early in the season, owing, probably, to some climatic conditions, we were troubled in some instances in getting the *Vedalia cardinalis* established, but when once started, it was the same old story—the extermination of the scale completely.

We have also found a few instances where the *Aspidiotus nerii* infested, to a very limited extent, the fruit of the lemon, but no very material damage occurred from this cause.

It is becoming quite common to hear reports of trouble in all the coast counties with *Mytilaspis citricola*, or purple scale, but at the present date we feel warranted in saying that it has not made its appearance in San Bernardino County, and we earnestly hope that it never will.

The *Lecanium oleæ*, or black scale, is very steadily pushing its way farther inland. Spraying is practically at an end for this pest on citrus trees. People are thoroughly awake to the fact that fumigation is the only practical method in this county to combat scale insects—the *Icerya purchasi* excepted—on trees which do not shed their leaves, for the reason that no matter how effective a wash, of whatever make it may be, yet on all trees of four years and upward it is estimated that good average spraying covers only about 80 per cent of the tree. This necessarily leaves at least 20 per cent of surface entirely untouched by the wash, and that per cent of the scale on the tree alive and ready for business.

We recommend, further, that *system* is emphatically necessary when fumigation is being done. To illustrate what our idea of "system" is, I will quote our own method. We appoint a man who has had experience in this line as superintendent of fumigation. He in turn appoints a foreman for each outfit of tents—we use about thirty tents in each outfit. The foremen hire their own crew, and are each held responsible, for the kind and quantity of work done, by the superintendent, who, by the way, serves notice ten days in advance of the tents, according to law. Foremen are discharged only for cause. They are, however, obliged to obey orders of the superintendent to the letter. This makes it possible to have all orchards fumigated alike. This is our "system."

Our aim is to kill, if possible, every scale of whatever kind there may be on the tree, and not injure fruit or foliage. Probably the best proof of the quality of our last season's work under this system is the fact that at the present time, when we are just commencing this season's work, we have on our books about 1,200 acres, voluntarily listed for fumigation in advance, while at this time last year we did not have one acre listed.

With an outfit of thirty tents each foreman is furnished with the following: A set of scales, two graduates (one for water and one for sulphuric acid), a table, lantern, case of cyanide of potash, carboy of sulphuric acid, and forty-five vessels. All of these are charged to the foreman by the superintendent, for the purpose of keeping tab on the business. Using forty-five vessels enables the foreman to have fifteen vessels, or enough for one half a row of tents, always at the table to keep the work going, and this enables the crew to change the tents each forty minutes, without the loss of any time. Hence, a row of trees is fumigated every forty minutes, with thirty trees to the row.

By this method the only incentive possible is to see how well the work can be done. There is no incentive to withhold the proper quantity of chemicals, or to shorten the time of exposure, or to keep the tents on the trees, as it would not increase the profit to any individual in the least. On the other hand, if any foreman fails to obey orders, or uses poor judgment in calculating his work, he is morally certain of losing his place.

Our aim is to pay good, fair wages, in order that it may be possible to always have the best of men for the work. The work is performed in the night, and we pay the foreman 30 cents per hour and his assistants are paid 20 cents per hour. Our superintendent is one of our inspectors, and is paid by the county, while the orchardists pay all the other help, and have the use of the tents free with the exception of $1 per day for each outfit, which is paid to a man who takes the contract to keep all the tents in good repair—and we see that this is done. The orchardist pays cost price for the chemicals used on his trees, and these are bought at wholesale by the county, under contract made from the lowest bid offered in answer to an advertisement.

Our tent repairer will this season keep two sewing-machines, one rotary and one common, in the field, with two men to run them, every day. We expect in this way to keep the tents in perfect repair without the use of glue.

To sum up the situation, we would say, first, that it is necessary to have the law to compel the obstinate orchardist to clean up and not to breed scale to reinfest the trees of the good orchardist, who spends his money that he may have clean and profitable fruit; second, that the work may be done in a systematic manner, that if there is a right method, all may be done alike. We invite thorough investigation.

In San Bernardino County we have two parasites that are effective on the *Icerya purchasi*, the *Vedalia cardinalis* and the *Novius koebelei*. As between these two, honors are easy, as both are perfect in their way. Chalcid flies are very beneficial in subduing the soft brown scale, the *Lecanium hesperidum*, and the *Aspidiotus nerii* and the *Aspidiotus camelliæ*.

We have tried the *Rhizobius ventralis* four years, and have probably made the most systematic effort of any locality to establish them in our county, with this result: In one olive orchard only they have continued for four years, but they have not increased in numbers, neither have they diminished the quantity of *Lecanium oleæ* in that orchard. Hence, we conclude that until different conditions prevail it is not a business proposition for us to depend upon them to keep our orchards in condition to be a source of revenue.

Respectfully submitted.

S. A. PEASE, Chairman.
R. E. McGINNESS.
ROBT. T. CURTIS, Sec'y.

SAN BERNARDINO, September 27, 1898.

SAN DIEGO COUNTY.

To the Honorable the State Board of Horticulture:

GENTLEMEN: The general condition of the county is very satisfactory, as far as the work of the Horticultural Commissioners is concerned, as the County Commissioners have given personal supervision to the entire field, and in every instance the hearty coöperation of the ranchers has been secured, and has proved most helpful in the matter of cleaning up the orchards infested with injurious insects. No one method has been rigidly adhered to, but the aim of the Commissioners has been to do the most possible good with the least possible expense. Simple and inexpensive methods of spraying have been very effective, generally as much so as the more expensive modes of treatment.

The result of this liberal policy has worked a revolution in orchard work, both as regards irrigating, cultivating, pruning, thinning, and the selecting of soil which is adapted to the different kinds of trees planted. Many of our orchardists to-day are suffering from the fact that their trees were planted in soil not especially adapted for tree culture.

The year has been disastrously dry on the coast side of the county, and the water supply short from both natural and artificial sources, although fruit trees well established have suffered less than cereals. All crops of the mountain district are above the average.

Tree-planting during the year was very light, compared with former years.

We have had phenomenal success in the line of inducing our nurserymen and dealers in nursery stock not to import nursery stock into our State from any other State or country, and that we are well provided in San Diego County with everything to meet all demands. Our greatest drawback to the fruit industry is the injurious insects and the diseases of plants that have been brought to us on imported nursery stock.

The helpful insects, excepting the *Vedalia cardinalis*, which is an invaluable aid in destroying the cottony cushion scale, are as yet an unknown quantity, so far as positive reliance can be placed on them as permanent and effectual remedies for the extermination of scale in all sections and localities. In the Fallbrook district they are doing good work in many orchards; they have completed the work of extermination, but as many as twelve hundred acres of orchard trees which were infested with scale are now, with the aid of the *Rhizobius ventralis*, comparatively free from the ravages of the pests.

We have reports from the bay districts which tend to show that the propagation and usefulness of this helpful little scale-destroyer is greatly hampered by its enemies, and instead of increasing in number they are diminishing.

The crop of deciduous fruit will be medium in quantity, and this was effected by frost. The olive crop will be light, no doubt, as the result of the diminished winter rainfall, which deprived the trees of their vigor, and the fruit dropped prematurely; the same is also true to some extent with the orange.

The advance in the price paid for lemons has greatly stimulated the industry, and as better methods of handling, curing, and marketing are adopted, more general success and satisfaction in regard to the lemon industry will prevail. No portion of our State is more thoroughly learning the lesson that, by the employment of only the best methods in every department of horticulture, will the best results for the grower be insured.

Fruit and fruit trees found to be infested with injurious insects have been seized, and disinfected, such as pineapples infested with *Dactylopius longispinus;* and apple trees infested with woolly louse (*Schizoneura lenigera*) were seized and condemned.

Respectfully submitted.

CHESTER GUNN.
F. AUSTIN.
GEO. B. HALL.

SAN DIEGO, September 1, 1898.

SAN JOAQUIN COUNTY.

To the Honorable the State Board of Horticulture:

GENTLEMEN: The San Joaquin County Board of Horticultural Commissioners herewith submit this their first annual report, as organized and existing under and by virtue of an Act of the Legislature of California, approved March 31, 1897.

The present Board of Horticultural Commissioners of San Joaquin County was appointed by the Board of Supervisors of said county on May 18, 1897. The Commissioners appointed were George W. Ashley, Henry Armbrust, and C. W. Norton, and have remained to the present time. However, Mr. Ashley tendered his resignation to the Board of Supervisors in September, 1897, but it has not yet been accepted.

The Commissioners of the San Joaquin County Board of Horticulture discharge their duties without pay. It being thought that the expense of paying three Commissioners $4 per day each, as allowed by law, would be greater than the county could bear, the Commissioners signed an agreement with the county not to draw pay for their services. The Commissioners have since discharged all the duties of the office, which properly came before them, free of charge; but have not, of course, given their actual time and attention to the work of inspection and quarantine, that being left to inspectors appointed by the board and paid by the county.

The Commissioners organized on May 18, 1897, by the election of George W. Ashley as president, and C. W. Norton as secretary. Regular meetings of the board for the transaction of urgent business were held on May 22d and May 26th. At the latter meeting the time for the regular monthly meetings of the board was fixed for the first Saturday in each month.

In accordance with this rule a meeting of the board was held on June 5, 1897, at ten o'clock A. M. This arrangement, however, proving unsatisfactory, and it being found more convenient to meet just before the monthly meetings of the Board of Supervisors, rather than just after, the time of meeting was changed to the last Saturday of each month, since which time meetings have been regularly held at the appointed time, except on the last Saturday of September, when no quorum being present no meeting was held.

WHAT IS BEING DONE TO ERADICATE INSECT PESTS.

Upon looking over the field, immediately after their appointment, the board reached the conclusion that one man could not properly do the work of inspection of orchards and of quarantine, as fruit was arriving in the county from outside points, both by water and by rail, every day, and also large quantities were being disposed of in the markets daily, by local growers, all of which needed inspection. They therefore divided the county into two inspectors' districts, called the northern and the southern, and elected a local inspector for each.

These inspectors have since been commissioned as quarantine guardians in their respective districts, by the State Board of Horticulture. Since their appointment the inspectors have been continuously at work in their respective districts, inspecting orchards and fruit, eradicating insect pests, destroying infested fruit, etc. Of course, the time in which the inspectors have been at work has been too short for the accomplishment of great results. The season of the year also has not been the proper one for attacking and eradicating many of the insect pests with which the orchards of this county and State are infested, the red spider being the principal insect pest which could be successfully attacked at the time of the year in which the inspectors have been operating.

However, much has been accomplished by the inspectors in the way of familiarizing themselves with the location and condition of the orchards of the county, and in preparing for a vigorous campaign against all kinds of insect pests as soon as the proper season arrives. It is the practice of the inspectors to make notes of every orchard visited; of the name of the owner, and the person in possession; of the number of acres, of the number and varieties of trees, and the proportion of each variety; of the condition of the orchard as to care, cultivation, etc., and of the kinds of pests infested with, if any. The inspector also gives the proprietor, or person in possession of the orchard, information as to the condition of his trees with regard to insect pests, and informs him of the proper spraying material, or other treatment, to be used for their eradication, the season in which to apply it, and any other desired information.

The commission has also caused to be printed, for free distribution, a large quantity of pamphlets, containing the most approved formulas for treatment of the various kinds of insect pests, and diseases of fruit and fruit trees, which are distributed by the inspectors among the fruit-growers.

It is only proper to say in this connection, that thus far in the work the inspectors have met with almost universal courtesy, nearly all growers expressing themselves as pleased with the efforts being made by public appropriation to rid the orchards of the county of insect pests. Thus far in the discharge of their duties among the orchardists the inspectors have been obliged to serve but three formal notices on individual growers, ordering them to abate certain nuisances in their orchards, and on no occasion has the board found it necessary to order work of eradicating insects done at public expense, to become a lien on the property of the owner.

QUARANTINE AGAINST INSECT PESTS AND DISEASES.

Stockton is the principal local market for the fruit and vegetables grown in this county, and almost the sole point of entry for fruit grown in other localities and consumed here. The great bulk of the fruit imported into this county comes from San Francisco by boat, there being two lines of steamers plying between this city and the metropolis, but much is also brought in by rail. It requires a very large portion of the time of one inspector, acting in the capacity of a quarantine guardian, to properly inspect all the fruit thus arriving in Stockton from outside points. The inspector has in a very large number of instances found the fruit thus arriving infested with various kinds of scale, with codling moth, and with numerous other kinds of insect pests. It has been his custom to return infested fruit arriving from outside points to the shipper at his own (the shipper's) expense. Whether this course is the wisest and best admits of very serious doubt, as it is open to the objection that the same fruit, after being returned, may be reshipped to some other point. In at least one instance the inspector has been satisfied that fruit condemned by him and returned to the shipper has been sent back again to this county, mixed with good fruit. It would seem that the most effective and direct remedy in such cases is the immediate and entire destruction of infested fruit.

On this point this board would solicit advice from your honorable body. Fruit grown in this county and offered for sale here, if found to be infested with any kind of insect pests, is promptly destroyed by the inspector.

CONDITION OF THE FRUIT INTEREST.

Of the fruit interests of this county it may be said that they are little more than in their infancy. In the northern portion of the county, in the neighborhood of Lodi and Acampo, large areas have been planted to orchards by experienced growers. These orchards are nearly all in a healthy condition, productive, and free from insect pests. It is the small orchards, varying in size from a few trees to a few acres, planted years ago for family use, that are the propagators and breeding-places of the various insect pests.

On the whole, however, the fruit interests of this county may be said to be in good condition. Here the almond, peach, apricot, and pear are grown with great success, and are largely cultivated. The grape also finds the soil and climate of this county peculiarly adapted to its needs, and both wine and table varieties flourish with luxuriance. Lodi has become a very important point for the shipment of table grapes, the Tokay, in particular, finding there the perfection of size and color.

The commission, in submitting this report, regret that they cannot point to more definite results accomplished. They believe, however, that they have already done much to bring fruit-producers to realize that they are in earnest, and that they must take active measures to free their orchards from all manner of pests.

A year hence this commission hopes to furnish a report of more interest, and to be able to point to greater results.

Respectfully submitted.

GEO. W. ASHLEY, President.
C. W. NORTON, Secretary.

STOCKTON, October 18, 1897.

To the Honorable the State Board of Horticulture:

GENTLEMEN: The San Joaquin County Board of Horticultural Commissioners herewith submit this their second annual report.

This county is divided into two districts—the northern and southern. One inspector was originally appointed for each district, but at the present time there is but one inspector employed. The board meets regularly once a month and passes on the reports of the inspector, after which they are filed.

We find the reports of the inspectors of the northern and southern districts, as follows: Number of places inspected, 912; number of places infested with scale (codling moth), 797. After the owners were notified, the spraying became general. We can say that beneficial results have followed spraying.

We also find, after trial, that the lime, salt, and sulphur mixture has proven very effectual. For all varieties of trees we use a summer spray, composed of whale-oil soap, sulphur, and lye, which has been very beneficial for mildew and scale.

We cannot be too careful in protecting our orchards against the dreaded diseases which exist in many portions of this State. The root knot is becoming quite a serious trouble, especially to the almond, plum, and peach trees.

All trees from nursery stock have been carefully inspected before being planted or shipped, and any found affected with black knot were destroyed. Only good trees were sent out, for upon them the growers must depend for future profits.

There is a large acreage of excellent fruit land surrounding Stockton, which is adapted to all kinds of fruit and nuts. There are other tracts of fine land near Lodi, Lockeford, Acampo, and Clements.

San Joaquin County had bright prospects for a bountiful crop of all kinds of fruit, but unfortunately, a destructive frost visited this section and destroyed all of the almonds and apricots, and badly damaged the peach and plum crop.

We will have a fair crop of grapes, with the exception of a few vineyards, which will be short, on account of lack of moisture. Grapes shipped from this county are bringing higher prices than those from other places.

Stockton is becoming a great distributing point for fruit to both San Francisco and the mountain towns, on account of its cheap transportation both by rail and water.

This county was one of the first to condemn pears and apples infested with codling moth. Since, other counties have followed in the good work.

During the past year we have condemned the following fruit: Apples, 693 boxes; pears, affected with codling moth, 77 boxes; oranges, affected with scale, 312 boxes; lemons, affected with scale, 155 boxes; total, 1,237 boxes. The most of this fruit came from outside points.

There will be about two thirds of a crop of grapes; plums, about a half crop, and pears and apples, about a half crop. The peach yield is light, while apricots and almonds proved a failure.

There has been quite a decrease in tree and vine planting the past year, owing to the excessive dry season. However, there was quite a large acreage planted to trees and vines this season.

The following is a statement of the number of acres planted to trees and vines in San Joaquin County:

	Bearing.	Not Bearing.	Total.
Lemons	4	3	7
Oranges	17	27	44
Olives	60	98	158
Figs	90	25	115
Cherries	75	78	153
Apples	36	18	54
Apricots	675	230	905
Peaches	785	240	1,025
Pears	248	60	308
Plums and prunes	800	395	1,195
Almonds	855	560	1,415
Walnuts	25	12	37
Small fruits	540		540
Wine grapes	500	200	700
Table grapes	760	395	1,155
Raisin grapes	522	204	726
Totals	5,992	2,545	8,537

The present Board of Horticultural Commissioners consists of the following members: George W. Ashley, Henry Armbrust, and A. W. Young.

The number of days the inspectors are employed are from twenty-five to twenty-six monthly, at a cost of $2 50 daily, amounting to $62 50 or $65 per month, as against fifteen days at $5, or a total of $75. As now arranged, the inspectors are employed more days at a less cost than formerly.

Respectfully submitted.

GEO. W. ASHLEY,
A. W. YOUNG,
HENRY ARMBRUST,
Horticultural Commissioners.

STOCKTON, October 1, 1898.

SANTA BARBARA COUNTY.

To the Honorable the State Board of Horticulture:

GENTLEMEN: I have the honor of submitting the following annual report of the Board of Horticultural Commissioners of Santa Barbara County:

In January, 1897, there appeared upon some lemons at the Lemon Exchange of this city, a skin disease which rendered the fruit unsalable. It was first found on lemons picked the previous November, but continued to appear in later gatherings, and in several orchards of varying conditions, as to elevation, exposure, fertilizers, and general treatment.

Specimens were sent to your entomologist, Alexander Craw, who referred us to Professor Newton B. Pierce, of Santa Ana, and weekly specimens were forwarded to him, that he might better watch its development. After several weeks' investigation, Professor Pierce wrote us that he found nothing by which he could determine the disease, its cause, or cure. In April it began to disappear, and soon after could not be found. We hope it may not visit us again.

The present season has been most favorable for insect life, and we find nearly every variety in abundant evidence. The cottony cushion scale (*Icerya purchasi*) has been found in greater numbers than for some years past, but Commissioner T. N. Snow has bred the *Vedalia cardinalis* in sufficient numbers to supply all infested orchards, and thus the pest has been destroyed.

The red scale (*Aspidiotus aurantii*) has been found in four orchards, and the steel blue ladybird (*Orcus chalybeus*) has been successfully colonized in each, and is doing good work in destroying the scale.

The black scale (*Lecanium oleæ*) has been nearly exterminated from the olive and orange orchards by the rhizobiids, and the fruit of these is clean. In the lemon groves there is great diversity of results. Some orchards are absolutely clean without the least spraying, the rhizobiids doing all the necessary work. Others are kept clean by frequent spraying; still others are in a badly infested condition, whether sprayed or well stocked with rhizobiids.

The San José scale (*Aspidiotus perniciosus*), which has troubled us much in past years, especially in the northern part of the county, is, by far, less than usual this year.

The codling moth has been reduced to lower than average per cent by spraying for several years with Paris green, while the woolly aphis has been kept in check largely by various species of ladybirds, which have fed voraciously upon it.

During this summer the gray caterpillar (Tussock moth larva) has been very destructive in the Lompoc Valley, and vigorous efforts have been made by Commissioner Dorris to destroy it.

The purple scale of Florida (*Mytilaspis citricola*) has been discovered in five orchards in limited numbers. The owner of one orchard had the trees destroyed by burning them; the others were subjected to strong spraying, which reduced them to a small per cent. In one orchard, parasites were found destroying the scale, but their number was small; yet we have expectation of receiving a ladybird from Hawaii which is said to be a thorough exterminator of the purple scale.

As a result of the year, our fruits compare favorably with those of other years. The early crops—the apricots and early peaches—were light; the same may be said of prunes.

The birds have been very troublesome, destroying a very large proportion of apricots, peaches, and pears in some localities. The later fruits, especially late apples, are in large quantities and of excellent quality. The walnut crop will be under the average in quantity, but the size and quality of the nuts will be good.

The output of nursery stock last spring was very large in the northern part of the county, and many trees were shipped in from other counties to supply the demand.

Some of these were infested, and were either destroyed or carefully and thoroughly disinfected before being planted. A rigid inspection of all depots was kept up during the season, that no importations should escape examination.

The lemon crop has been fair in quantity and quality; but prices have ruled low, on account of the glutted Eastern market. Yet the growers have not lost courage, as is evidenced by the recent plans of the Lemon-Growers' Exchange of Santa Barbara to build another curing-house in Carpinteria Valley for the accommodation of their large crops.

The crops of dried fruits in the Santa Maria and Carpinteria valleys have been very satisfactory.

Respectfully submitted.

C. D. DORRIS, President.
T. N. SNOW, Secretary.

SANTA BARBARA, September 24, 1897.

To the Honorable the State Board of Horticulture:

GENTLEMEN: We, the County Horticultural Commissioners of Santa Barbara County, beg leave to submit the following report for the year ending September 30, 1898:

The fruit crop of one year ago was large, and averaged fully up to the standard of former years as to quality. From the Lompoc Valley there were shipped, in the autumn of 1897, over 22,000 boxes of apples, besides a large amount of pears and other fruits. Prices were good. Walnuts, which were controlled by the "Walnut Exchange," brought very satisfactory returns, but those held by private individuals for higher prices are still in the storehouses.

The winter and spring of 1898 passed with a very light rainfall, and grain, vegetables, and fruits have been sadly injured thereby; the first two being almost an entire failure, except where irrigation could be resorted to, and the last being greatly diminished in quantity and quality. In March, severe frosts came, making a very unfavorable beginning for our fruit industry this year; and these were followed by continuous dry winds during much of the spring months, and truly the prospect was disheartening. Then June came in with one week of intensely hot weather, and it looked as though what there was on earth would be burned up. The remainder of June, and the whole of July, and a good part of August were comparatively cool and somewhat cloudy; vegetation revived, and many of our fruits have given from one half to three fourths of usual crops. The Lompoc Valley is expected to ship 15,000 boxes of apples, and a considerable quantity of other fruits. The Santa Maria Valley will also ship quite extensively; while Santa Barbara finds a home market for most of the products of the valleys between the mountains and the sea.

In the upper portions of the county, embracing Lompoc, Santa Rita, and Santa Maria valleys, the beneficial insects (both the imported and the native ladybirds) have been very scarce, while in Santa Barbara district they have been quite plentiful every month. For this reason the woolly aphis and the San José scale have spread a good deal in the orchards of the above-mentioned valleys. The causes for the scarcity of ladybirds is thought to be the severity of last winter, followed by the very high winds that prevailed through the spring and summer, as the farther south we went, the more abundant they were found, as far as Claremont. In the first district the woolly aphis and San José scale have been less prevalent than in any former year. The black scale has been quite scarce in most localities; some orchards of lemons, heretofore badly infested, have been practically clean this season, and that, too, without spraying or fumigating, the whole work being done by the rhizobiids and other parasitic insects.

The red scale (*Aspidiotus aurantii*) has not increased, and the fruits have been comparatively clean and fair as to quality.

The County Commissioners have given all necessary attention to the work required of them, aiding the fruit-growers in every way possible during this most trying year; and we hope that the rain of September 25th and 26th, which in this county varied in different localities from 2 inches to 4½ inches, is a promise of a brighter and more prosperous year for 1899.

Respectfully submitted.

C. D. DORRIS, President,
T. N. SNOW, Secretary,
C. J. RUSSELL,
Horticultural Commissioners of Santa Barbara County.

SANTA BARBARA, September 30, 1898.

TEHAMA COUNTY.

To the Honorable the State Board of Horticulture:

GENTLEMEN: I have the honor to submit herewith the report of the Board of Horticultural Commissioners of Tehama County.

The present board was appointed in June, and in compliance with the new horticultural law approved March 31, 1897.

The board divided the county into three districts, with R. W. Coates, of the second district, chairman, and W. C. Mount, of the first district, secretary. J. Granville Jones of Vina is the other member.

Owing to the lateness of the season when the present board came into office they could do nothing to exterminate the codling moth or the peach moth, which we find are the worst pests in this county. Every orchard in the county is infested with these pests, and it will require very vigorous treatment to suppress them. There are but few scale insects in this county, and we intend to make them scarcer. A few brown scale were found on orange trees, but the hot weather during August killed them.

Yellow mite appeared in some prune orchards, but timely spraying prevented any serious damage. Sheep dip is a favorite spray with orchardists here, for yellow mite. One orchardist here refused to spray for yellow mite after his neighbors had cleaned up their orchards, and the Commissioners had to have it done, but the orchardist paid the bill without allowing it to become a county charge.

The frost during the last of March killed most of the apricots, with the exception of Moorparks, which yielded a heavy crop.

Most of the early varieties of peaches were frozen. Muirs were a good crop. The peach crop in general was light and not of choice quality.

Pears were a half crop. The largest and finest prune crop the county has ever produced is now harvested and nearly cured.

The season has been unusually favorable for drying fruit. A hot wave in July caused the oranges to drop some, but the trees are well laden yet, and the fruit is of fine quality. But little planting was done here last season, and but very little will be done the coming season. Orchardists here are beginning to realize more fully the advantages of irrigation. Where the water cannot be carried on the land by means of ditches, pumping plants, in a small way, have been erected. Wherever practicable, they have been placed on the river bank, but some orchardists not situated on the river have sunk wells, with good results.

Respectfully submitted.

WILLET C. MOUNT,
Secretary.

RED BLUFF, September 30, 1897.

To the Honorable the State Board of Horticulture:

GENTLEMEN: I have the honor to submit herewith the report of the Board of Horticultural Commissioners of Tehama County.

The fruit crop in general was very light in this county this season, caused chiefly by frost. Pears were a good crop. Cherries were almost a total failure. Peaches were very scarce, with the exception of the Muir variety and a few clingstones. The Muir peach seems to withstand the frost better than any other variety. Apricots were almost a failure; the Moorpark was entirely so. About two weeks after the frost killed the apricot blossoms, a great many trees bloomed again, and nearly all the apricots harvested this season were produced from these late blossoms.

The almond crop on the bottom lands was entirely killed; some few were raised on the hill lands.

The apple crop is heavy this season. The apples raised in the mountain districts of this county are as fine as can be produced anywhere, and are gaining a world-wide reputation.

The prune crop in the valley is very light, while in the mountains it is very heavy. Few Silver prunes were ever planted in this county, but all those planted have proven a disappointment. They do not begin to bear as young as the other varieties. They have proven to be shy bearers. After the hot season commences the fruit begins to get spotted and continues to fall, so that very little fruit matures in a perfect condition.

The olive crop is very light this season. Citrus fruits bid fair to be a good crop.

The ravages of the codling moth and peach moth were not as severe this season as heretofore, owing in a great measure to timely and intelligent spraying.

The yellow mite has proven a very serious pest this season, the dry weather being very favorable for their spreading.

Gas-lime and ashes were used to some extent the past season to kill woolly aphis, and with good results.

Some scale (*Aspidiotus perniciosus*) were found throughout the county, and they are spreading to some extent.

All the citrus trees arriving in the county the past season were gased before being released, as were also all nursery stock from Oregon.

A consignment of nursery stock from Oregon was found infested with the Eastern peach-root borer (*Sannania exitiosa*), and was condemned and burned.

All nursery stock found infested with root knot was burned.

Respectfully submitted.

WILLET C. MOUNT,
Secretary.

RED BLUFF, September 28, 1898.

VENTURA COUNTY.

To the Honorable the State Board of Horticulture:

GENTLEMEN: The County Board of Horticultural Commissioners of Ventura County respectfully submit their annual report.

During the past year this board has not been as active as usual, because we thought it unnecessary to inspect the orchards oftener than once in two years. Last fall we intended to gas some citrus orchards infested with black scale in localities where *R. ventralis* did not thrive, but the hot weather killed so many scale that the growers thought it would be an unnecessary expense, so we concluded to let it go until this season. We are now making an inspection of all citrus trees, and will order all orchards gased where the scale is thick enough to smut the fruit. Some purple scale was found in an orchard near Santa Paula last fall, and thoroughly gased. Codling moth is slowly spreading over the county, and this, with the black scale, gives more trouble than all other pests put together. We have little trouble in keeping down the pernicious scale with the lime, salt, and sulphur wash.

Almond trees are more or less infested with clover mite, and walnut trees with aphis, but they do not seem to do much harm, and little attention is paid to them.

Owners of Navel orange orchards have done well this season, but owners of Seedling and Mediterranean Sweet orchards have little more than made expenses. Lemon-growers have done fairly well, but the crop was light. Apricots brought a good price, and on moist or irrigated ground were profitable, but prune orchards are being pulled up on account of their failure to bear in this county. Grapes bear well and are healthy, but the price has been too low to induce many people to go into the business.

And, taken altogether, this has been a bad year on fruit-growers.

Respectfully submitted.

W. I. RICE, Chairman.
J. F. McINTYRE, Secretary.

VENTURA, October 1, 1898.

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